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VITAMIN A RESEARCH AND ITS CLINICAL APPLICATIONS IN PEDIATRICS

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TWENTY-FIVE years have elapsed since Mendel[1] and his co-workers and McCollum[2] and associates discovered what we now call vitamin A. These investigators fed rats mixtures of foodstuff, the composition of which simulated that of milk; they found that when lard was the fat used, in contrast to butter, the albino rat would not grow properly and maintain health. This discovery made the beginning of the vitamin era and served to explain in part what had been known for many years previously: namely, that fresh vegetables and citrus fruits were beneficial in the treatment of scurvy, cod-liver oil in rickets, liver in night blindness, and the substitution of barley for polished rice in beriberi. It was Sir Gowland Hopkins,[3] who in 1909 suggested the term "accessory factors" for the indispensable substances he found necessary for growth and maintenance of animal life, and it was Funk,[4] who in 1911 introduced the word "vitamine" for a like group of protective substances. Later McCollum suggested that this unidentified dietary factor be designated as "fat-soluble A." Since the true chemical nature was still unknown, Drummond[5] advocated that the word "vitamine" be changed to "vitamin," and it was agreed that the McCollum alphabet grouping be retained to provide distinctive labeling until a more scientific nomenclature was accepted. Six of these vitamins are now recognized as chemical entities; five have their structures elucidated; others have been postulated; it seems reasonable to believe that still more will be found.

Today the vitamins are classified as a single group of nutrients. They are organic substances but are not related chemically to one another. It has been demonstrated that they are effective in small quantities. Since the vitamins promote growth and keep the functions of the body normal

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instead of furnishing materials for building tissue or for supplying energy, they are often described as body regulators. According to Wolbach,[6] they are necessary for the chemistry of the individual cell. He also points out that some species may have the power of synthesizing them from elementary compounds, as has been proved for the rat in the case of vitamin C. The absence of a vitamin from the tissue may result in a suspension of intracellular biochemical reaction necessary for this particular tissue concerned and, indirectly, for the organism as a whole. From the investigations of the experimental nutritionalist there is every reason to believe that as long as vitamins are present in the diet in sufficient quantities, all is well, but as soon as they are lacking or present in insufficient quantities, the disease or abnormal condition they prevent, develops.

VITAMIN A AND ITS PRECURSOR

Long before anything was known of the chemical nature of vitamin A, plants having a yellow or green color were recognized as a rich source of this vitamin. Further investigations revealed that foods having a yellow or green color are generally rich sources of this vitamin, and green leaves, yellow corn, and sweet potatoes are better sources than bleached leaves, white corn, and potatoes. Thin green leaves are very valuable for their vitamin A content. According to Coward and Drummond[7] the vitamin A value in a seedling is associated with the appearance of the green color, so that carotene and chlorophyl formation normally go on in a more or less parallel way in young plants and green leaves. These observations would lead us to conclude that the green leaves of food and forage crops serve directly and indirectly to supply us with vitamin A values. Their vitamin activity has been traced to the presence of carotinoid pigments and more recently the xanthophyll pigment kryptoxanthin. Although vegetable carotin was isolated from the carrot in 1826 by Wochenroder, it was only recently recognized that it is almost never a single carotene, being usually a mixture of at least three forms. They are designated as alpha, beta, and gamma carotene, and kryptoxanthin. The empirical formula for the three carotenes is the same $C_{40}H_{56}$; that for kryptoxanthin is $C_{40}H_{55}OH$.

Each of these substances has in its molecular structure at least one β-ionone ring and a side chain of alternate doubly and singly bound carbon atoms containing nine double bonds and four methyl groups. Recent claims for the synthesis of vitamin A give evidence pointing to its actual chemical configuration. Holmes and Corbert[8] as a result of a series of noteworthy investigations at Oberlin College bring us nearer to the realization of obtaining a crystalline, probably pure form of vitamin A. Vitamin A appears to have one β-ionone ring and a side chain containing four double bonds and two methyl groups, also it has been shown by esterification reactions to contain one hydroxyl group

characteristic of alcohols. By comparing the formula for vitamin A with those for the carotenes, it is readily seen that theoretically one molecule of beta carotene should give rise to two molecules of vitamin A.

DIFFERENCE BETWEEN VITAMIN A AND CAROTENE

Von Euler and his co-workers[9] and Moore[10] amply demonstrated that small doses of the highly purified yellow pigment carotene suffice to cure rats which exhibit the symptoms of avitaminosis due to the lack of vitamin A. This observation immediately threw the experimental worker into confusion, for the question arose as to whether the substance previously fed was the alleged vitamin A or carotene. Several English workers[11] examined their materials photospectrographically with the result that the following differentiation was made:

Carotene	*Vitamin A of liver oils*
Synthesized in the plant	Stored in the animal
Orange red	Almost colorless
328 mμ absorption band absent	328 mμ absorption band present
Greenish-blue antimony trichloride reaction showing absorption at 590 mμ	Vivid blue antimony trichloride reaction showing absorption at 572 and 606 mμ

Although both these compounds are soluble in fats and in so-called fat solvents, there is some evidence which indicates that their absorption in the intestinal tract is somewhat different.

Jackson[12] and Rowntree[13] demonstrated a difference in the absorption of carotene and vitamin A in the organism when liquid petrolatum was added to the ration. Apparently vitamin A itself is satisfactorily utilized in the presence of liquid petrolatum, whereas carotene is not absorbed from the intestine when liquid petrolatum is present. Greaves and Schmidt[14] showed experimentally that when the bile was shunted in the small intestine to the colon, symptoms of a vitamin A deficiency were not alleviated by early administered carotene, whereas under the same condition vitamin A itself was effective. Similar results obtained with jaundiced animals support the view that, whereas vitamin A can be absorbed from the intestine in the absence of bile, the presence of this body fluid is essential to the utilization of carotene given by mouth. Still another study bearing on this point is that of Guilbert, Miller, and Hughes,[15] who used cattle, sheep, and swine in their studies of the minimum vitamin A requirement to prevent night blindness. Carotene was provided by alfalfa and by crystalline carotene; vitamin A was administered as cod-liver oil. After careful evaluation of the potencies of these substances, it was concluded that vitamin A prevented hemeralopia in these species much more readily than carotene.

Sufficient evidence is at hand showing that there is an intimate relation between plant pigment carotene and the indispensable accessory

food factor known as vitamin A. The vitamin A potency of plant material is largely due to carotene, whereas that of animal products is to a greater or less extent accounted for by vitamin A itself. Carotene is now considered as provitamin A because the animal organism is able to convert it into active vitamin A. This process probably takes place in the liver. The liver is also the principal storehouse of vitamin A in the body. When an animal ingests carotene, part, but not all of it, is converted into vitamin A. In the human body carotene itself is found in the blood attached to the albumin in colloidal combinations. The presence of carotene in the blood was established as early as 1913 by van den Bergh and Snapper.[16] Carotene is also found normally in the spleen, liver, bone marrow, retina of the eye, corpus luteum, kidneys, and subcutaneous fat. The fact that the liver plays an important rôle in the conversion of the provitamin to the vitamin is shown by Ralli and others,[17] who report that, following the administration of carotene in oil, the blood carotene rose sooner in diabetic patients than in normal individuals, and the increase was greater and was maintained for a longer period of time. However, a second administration of carotene to nondiabetic patients did not result in any greater increase in the blood carotene than did the first dose, but in the diabetic patients a second dose of carotene caused a greater increase in blood carotene in all but one case. They conclude from these observations that there is an increased concentration of carotene in the liver of the diabetic patient due to a diminished ability on the part of this organ to convert carotene to vitamin A and that this increased concentration interferes with the absorption of carotene from the blood.

According to Sherman,[18] the transformation of carotene into vitamin A in the animal organism, like that of the human, is not always immediate and complete; hence, body fat, milk fat, or egg fat often contain both vitamin A itself and more or less of some of the precursor or precursors. Thus the vitamin A value of different samples of liver, of egg, of milk, or of butter may be due to vitamin A itself and carotene in varying proportions. It is of interest that the muscles do not contain any important amount of vitamin A and the adipose tissues are an unreliable and usually unimportant source.

THE STABILITY OF VITAMIN A AND CAROTENE

Then the question arises as to the stability of these vitamin A values. It has been amply demonstrated that the physiologic activity of both vitamin A and carotene can be rapidly destroyed at high temperatures when oxygen or an oxidizing agent is present. According to Eddy and Dalldorf[19] the stability of any source of vitamin A will depend on the accessibility of the vitamin or provitamin to oxidizing factors, to the presence or the absence of protecting factors, such as antioxidants in the holding source, or to the skill of the manufacturer in avoiding the

action of oxidation in the preparation and merchandising of the vitamin sources. Practically all plant sources and animal sources show progressive destruction of the vitamin A during storage unless measures are taken to prevent fermentation and oxidation. Frozen products, however, seem to retain their vitamin A value well, whereas dehydration can be destructive to vitamin A unless quick drying to inactivate enzymes is utilized to prevent the destruction. Heat treatment in ordinary cooking operations appears to destroy little of the vitamin A value perhaps because the carotene is less labile in plant tissues than is vitamin A itself. It is not readily affected at the ordinary temperatures of boiling and baking but is destroyed at high temperatures such as those obtained in frying. It is said that the destruction of vitamins is less when foods are heated at high temperatures for short periods than when they are heated at low temperatures for long periods. Although vitamin A is only slightly soluble in water, only small quantities of water or no water at all should be used in cooking. Steaming is one of the preferred methods for cooking, since the time required is short and the amount of water used is small.

STANDARDIZATION OF VITAMIN A

It is very important to know how much of vitamin A value is required by the body for the maintenance of normal growth and health. With the establishment of an international standard for vitamin A and standard methods of assay, it has become possible to express the vitamin A content of foods in terms of a recognized and acceptable unit. The international unit (the provisional unit adopted by the 1931 conference) is the vitamin A activity of 0.001 milligram (1 gamma) of an international standard preparation of beta carotene (provitamin A).

The new vitamin A unit adopted by the 1934 International Conference is the activity of 0.6 gamma of beta carotene. This amount of beta carotene has the same biologic activity as 1 gamma of the original International Standard beta carotene.

At present we have only a rough indication of the requirement of vitamin A by man. I shall, however, discuss later our clinical experience with vitamin A value and the factors which may influence the requirement.

THE FUNCTION OF VITAMIN A

The importance of vitamin A for the maintenance of normal growth and stamina of the experimental animal has long been known to the laboratory worker. Lack of vitamin A in the diet of animals results in a widespread weakening of the body and inability to resist infection. In addition, it was revealed that the lack of vitamin A in the diet produced such ocular disturbances as photophobia, blepharospasm, hemeralopia, xerosis conjunctiva, xerophthalmia and keratomalacia, and finally

the eyes were lost and the animals succumbed. Although the ocular disturbance in the animal resembled that described in human cases, there are very few published records of the histopathology in humans.

It was my impression when I[20] presented this subject in 1922 that the ocular lesions which were produced in the albino rat were due to the lack of proper secretion from the lachrymal glands accompanied by subsequent lowering of the tissue resistance with consequent invasion of the eyes by bacteria. It was later pointed out by Wolbach and his associates that the primary effect of vitamin A deficiency was really an alteration of some of the epithelial cells. He describes the first observable consequence of the absence of vitamin A as an atrophy of epithelial structures in many locations and a replacement of the tissue by stratified keratinizing epithelium which is identical in appearance in all locations and arises from focal proliferation of basal cells. The lesion was labelled keratinizing metaplasia. This condition occurs in the ducts of many glands such as the salivary, submaxillary and the parotid glands, in the glands themselves, and many mucous membranes. Not all epitheliums show this effect. He points out that the mucosa of the stomach and intestines and the renal tubules show practically no such change. This observation is extremely important, for in the early experimental reports are many allusions to kidney and bladder stones. Their presence was attributed to a vitamin A deficiency, but the addition of vitamin A to the diet did not seem to eradicate the stones. It may be possible, according to Wolbach, that "apparently mature epithelial cells," like those found in the liver and renal tubules which possess power to multiply in addition to their physiologic activity in behalf of the organism as a whole, do not respond to vitamin A by keratinizing metaplasia.

Generally the keratinizing metaplasia continues while the animal is deficient in vitamin A. Strangely enough the basal cells normally concerned in maintaining the integrity of the epithelium respond by active mitotic division during the deficiency. The proliferating cells undermine and even replace the original epithelium. As a consequence of this exfoliation and constant reparative proliferation which takes place, there is an abnormal accumulation of keratinized epithelial cells in many glands and their ducts as well as in other organs. Thus, in the lungs of the experimental animal this process may lead to cyst formation, bronchial occlusion, and such conditions as bronchiectasis and atelectasis. This accumulation of broken down materials naturally leads to dysfunction of the respective glands involved, and serious damage is done to the organ itself.

Further evidence of vitamin A deficiency is found in the incisor teeth of rats and guinea pigs because these structures, according to Wolbach and Howe,[21] grow at a fairly rapid rate throughout the life of the animal, and because the leading rôle in the organization of the tooth at the formative end is played by the enamel organ, an epithelial structure

which in vitamin A deficiency atrophies and undergoes keratinization. This process if unabated leads to cessation of the activity of the odontoblasts and the formation of dentine stops, and destruction of the dental structure takes place. Another consequence of vitamin A deficiency is that bones ceases to grow because of cessation of proliferative activity of the epiphyseal cartilage.

SECONDARY EFFECTS OF VITAMIN A DEFICIENCY

As a result of primary changes in the epithelial tissue and organs, secondary effects are produced in the laboratory animals and they are classified by Wolbach as (1) loss of weight due largely to loss of fat in all storage depots, but also to atrophy of musculature and many organs which do not undergo keratinizing metaplasia; (2) anemia; (3) cessation of growth of bones; (4) degenerative lesions of skeletal muscle; and (5) lymphoid hypoplasia of the spleen. All these lesions may be regarded as secondary consequences of vitamin deficiency.

LABORATORY OBSERVATION AND INTERPRETATION

Nearly all investigators have observed that when animals are restricted to a diet lacking vitamin A, they sooner or later lose weight, cease to grow and develop a pathologic condition of the eyes which is so characteristic that it must be regarded as one of the manifestations of vitamin A deficiency. A more detailed study of the sick animal revealed that the female also develops alterations in the genital tract that are pathognomonic of vitamin A deficiency. Thus many observers use vaginal smears as an indicator of the progress of changes due to vitamin A deficiency. Besides the outward ocular changes, it was noted that early in the experiment the rats showed poor dark adaptation, inability to adapt themselves to dark after being exposed to a bright light. It was suggested that the poor adaptation to dark is caused by a failure of the neuroepithelium of the retina to produce visual purple after being bleached by exposure to strong light. This assumption has been substantiated by the work of Fridericia and Holm[22] and Tansley.[23] Further evidence was produced by Holm[24] and Yudkin[25] to show that the retina was very rich in vitamin A value. This observation was later confirmed by Wald[26] when he demonstrated that vitamin A value of the retina was the same as that in cod-liver oil, namely, vitamin A and not carotene.

Several other important disturbances take place as a result of the lack of vitamin A in the diet. These conditions can best be shown by relating some of the experimental data and the clinical implications predicted on the data by several of the investigators.

For example, Sherman[27] reports the following experiment: Young rats were taken at the same age from liters of a known hereditary stock

but were fed on different diets, one richer than the other in vitamin A, both within the range of normal in this as in other respects. All were then subjected to the same experimental regime involving first a period of deprivation of vitamin A until the body no longer contained a surplus store of this nutrient, and then a longer period during which only a fixed limited allowance was fed; afterward, all were killed and examined for evidence of infection. Notwithstanding the relatively long period during which all had received the same diet, it was found that resistance to infection was still greatly superior among those which in their early lives had received the more liberal allowance of vitamin A. Sherman interpreted this observation as follows: This is an indication of the differences of incidence of infection to be expected among children around ten and twelve years resulting from differences in the way they were fed before they were three years old.

Sherman and Storms[28] report that the incidence of the characteristic symptoms was influenced by the age at which the experimental animal was subjected to the vitamin deficiency. The younger rats seemed more likely to develop eye trouble, while those which were older when subjected to the vitamin A deficiency more often developed lung disease.

Sherman and MacLeod[29] have described experiments in which parallel groups of rats of identical previous history were fed upon two types of diet, one rather low and the other fairly high in vitamin A. The experiment was started soon after weaning time and extended until natural death. The small amount of vitamin A proved sufficient for normal growth up to nearly adult size but not for successful reproduction, and rarely did it support satisfactory longevity. The other group animals receiving a more liberal allowance of vitamin A grew to fully average adult size, were successful in reproduction and rearing of young, and lived on the average of a little over twice as long as those on the diet equally good in all other respects but lower in vitamin A.

Yudkin, Orten, and Smith[30] demonstrated that normal-appearing adult rats which had been raised to middle age (315 days of age) on an adequate diet supplying, however, only the smallest amount of vitamin A that would permit normal growth and prevent the appearance of any symptoms of vitamin A deficiency, rapidly developed the deficiency when the vitamin A was entirely removed.

The first signs of ocular disturbance in both the young and the adult animal were lacrimation and photophobia; then the normally protruding eyeballs receded, producing an enophthalmos. The lacrimal secretion within a few days changed to a viscid, then to a serosanguineous discharge which adhered to the eyelids and frequently matted them together. In the meantime, the eyeball became slightly congested and the cul-de-sac filled with broken down cellular material. When this stage was reached the cornea became hazy and lusterless, and often a plaque

formed on the exposed cornea (palpebral fissure). In the adult animal deprived of vitamin A an herpetic eruption of the cornea seemed to be the more prevalent lesion. This could not be brushed off the tissue, as was possible with the plaque. The ocular lesion produced in the older animal was more destructive than that observed in the younger animals.

It is evident, therefore, that vitamin A is an even more important factor in the chemistry of food and nutrition than has previously been appreciated, for it must be supplied in liberal proportions, not only during growth but in the food of the adult as well, if a good condition of nutrition and a high degree of health and vigor are to be maintained.

THE PREVALENCE OF VITAMIN A DEFICIENCY

From early times records have come down to us showing the frequent association of ocular disease with famines caused by drought or war. Outstanding among the ocular disturbances was that of night blindness or hemeralopia. This ocular condition had been known to the ancients. Night blindness was endemic in Russia during the Lenten fasts and in many other countries where the economic stress was great and the food supply inadequate. Ophthalmologists have repeatedly referred to corneal ulcers, xerophthalmia and chorioretinitis of different types as due to faulty nutrition. These eye disturbances in man result from conditions so complicated that it is not possible without further evidence to attribute all of them to a specific starvation of a single vitamin.

Outspoken vitamin A deficiency in man appears to have been somewhat more common in Europe and Asia than in this country. Nevertheless, recent studies in this country would seem to indicate a surprising prevalence of subclinical vitamin A deficiency, particularly among children. The diagnosis is based on the assumption that individuals who show poor adaptation to dark have a vitamin A deficiency. No other ocular disturbance was observed in these people, and I take for granted that no abnormal refractive error was present. The dark adaptation was determined by instruments supposedly constructed for this purpose. From our present knowledge of the physiology of adaptation of the retina to stimulation of light and the experimental data on vitamin A these methods should be considered as empirical. Adaptation of a normal eye for darkness seems to depend upon the ability of the neuroepithelial cells of the retina to regenerate visual purple. There is some evidence, clinical and experimental, that visual purple depends on the presence in the retina of vitamin A or a closely related substance. Because of these associations a method for measuring dark adaptation has been sought as a criterion for determining vitamin A deficiency in man.

As yet there has not been established a norm on which variations in dark adaptation can be estimated. Clinical experience leads us to believe that there are several factors which may influence adaptation

to dark; for instance, using the fundi oculi as a criterion, true light complexioned individuals (blonds) seem to have a different norm from that of the dark complexioned individuals (brunets); prolonged dark adaptation is present in a variety of diseases; e.g., retinitis pigmentosa, retinitis albescens, choroideremia, glaucoma, and many others. It is important to point out that night-blind persons show poor dark adaptation, but poor dark adaptation does not signify night blindness. In the latter instance, the poor dark adaptation comes on after exposing the retina to bright light. This is probably the condition that we are dealing with in vitamin A deficiency. There is another type of retinal disturbance which is called "glare blindness," a condition which is often considered as nyctalopia in contrast to the condition of poor adaptation to dark known as hemeralopia. I believe both conditions are the result of the stimulation of a "sick retina" by strong light. The "sick retina" is probably a manifestation of insufficient nutrition to the part or invasion by a toxin.

Different methods have been devised for demonstrating dark adaptation and "glare blindness." Some are very simple while others are too complicated to be applied in routine clinic examinations. Some ophthalmologists determine the dark adaptation of a patient by comparing the reaction of the patient with that of his own. Until recently the outstanding apparatus for measuring dark adaptation was that used by Birch-Hirschfeld.[31] The photometer of Birch-Hirschfeld cannot be used with young children for it is too intricate. Although adults can manipulate the apparatus much better, it is time consuming to obtain final readings. It is excellent for laboratory work. Hecht[32] and his collaborators, using the same principle, have devised an apparatus which at the present time is very expensive and somewhat intricate to adopt for the examination of the dark adaptation of children. I see no reason why the method cannot be simplified and still retain its present principles. Frandsen[33] and others have used a method advocated by Edmund. This examination is made with Tscherning's photometric glasses and Edmund's test charts. The readings are objective, and the method is difficult to standardize and use. A test requires from sixty to eighty minutes. Another apparatus presented for measuring dark adaptation is that of Feldman.[34] It is less complex than those already mentioned. The only records available with this apparatus are those obtained by Feldman himself.

Recently an apparatus known as biophotometer was introduced for the detection of vitamin A deficiency. Studies made with the photometer reveal an astounding presence of subclinical vitamin A deficiency in this country. Jeans and Zentmire[35] found that 26 per cent of a rural group and 53 per cent of a village group presented evidence of vitamin A deficiency. Of the 78 rural and village children who were deficient in vitamin A and who continued under observation, all except 3 de-

veloped normal dark adaptation after a period of vitamin A ingestion. During the course of his studies, I. O. Park[36] found a high prevalence of deficiency, 83 per cent being given for one mixed group of adults and orphan Indian children in Oklahoma. Jaeghers[37] found a 34 per cent deficiency among supposedly healthy adults.

These recorded observations have led many to inquire whether this physiologic process of dark adaptation is truly a phenomenon depending on the presence of vitamin A or a similar substance in the neuroepithelium of the retina. If it is so, are the present methods of measuring dark adaptation accurate, reliable, easy to use, and can the data be evaluated? Palmer and Blumberg[38] report as follows:

"The biophotometer dark adaptation test has been used in surveys of 585 elementary school children in Maryland and the District of Columbia. Considerable improvement in readings, apparently due to a learning factor, resulted from the repeated testing of sample groups and demonstrated that little dependence could be placed upon survey results obtained from a single test of each child. In addition to the learning factor, significant variability occurred in successive tests. As a result of feeding experiments, evidence was presented against the validity of present standards for interpreting results in terms of vitamin A deficiency.

"The uncertainties of the learning factor, variability, and doubtful standards made it impossible to state definitely the incidence in the groups surveyed. However, the survey results gave no evidence for believing that vitamin A deficiency was prevalent among the school groups studied. The biophotometer test does not appear to constitute an accurate or reliable technique for detecting mild degrees of vitamin A deficiency in the routine survey of school children."

Pediatricians surely ought to be interested in the developments in this field and the search for more adequate methods applicable to children. On the other hand, it is pertinent to point out that the favorable reports coming from those using a biophotometer deal with observations on adults. Jaeghers goes so far as to set as a vitamin A minimum for adults about 4000 international units per day. Further investigations are needed and must be encouraged for the measurement of dark adaptation of the human eye. A test of this nature, if correct, will prove invaluable.

CLINICAL OBSERVATIONS

There are many types of nutritional disturbances in infants and children. No one factor is responsible for the symptoms frequently associated with the so-called deficiency diseases. They are as a rule due to multiple factors. Vitamin A deficiency is practically unknown in nurslings; nevertheless, when the mother suffers from malnutrition, the nursling will also present manifestations of deficiency disease. The

usual history of this type of disturbance reveals that the infant has been fed on a diet containing either insufficient milk, prepared milk, or no milk products at all, over a period of at least one or two months; in many instances a digestive disorder may precede the onset of symptoms resulting in a diminished food intake together with imperfect absorption of the food consumed. Simultaneously there is a failure to gain in weight, and this may be followed by an actual weight loss. The normal activity of the child is diminished. The skin may become dry and scaly. In older children, the eyes may show a viscid, stringy conjunctival secretion, matting the lids together. When the discharge is removed, the cornea is clear and the conjunctiva is not congested. There is present, a marked photophobia and blepharospasm which is aggravated by exposure to light. As the condition progresses, a dryness of the bulbar and palpebral conjunctivas takes place with a typical Bitot's plaque adhered to the exposed conjunctiva of the eyeball. The cornea may now show small single or multiple ulcers, which if unchecked, go on to perforation of the cornea. Sooner or later, hypopyon may result. In older children, the eye condition often does not progress beyond a xerosis conjunctivae, and corneal destruction is less frequent even with long periods of vitamin starvation. In infancy the course of the disease is more rapid. This may be due to the greater need of the vitamin for growth. As the disease progresses, intercurrent infections of the skin, lungs, and urinary tract may occur, and finally the condition may terminate in a bronchopneumonia or a diarrheal disorder.

Fortunately a well-defined vitamin A deficiency is recognized by most practitioners. The deficiency, in its early stages and in a mild form, is difficult to recognize, and it may be the cause of certain number of cases of unexplained nutritional disorders. Poor adaptation to dark following exposure to a brilliant light may be the result of this deficiency in many cases. Its presence should always lead one to suspect the possibility of vitamin A deficiency. Unfortunately, this phenomenon cannot be recognized in infancy. When a child shows a definite photophobia, blepharospasm associated with viscid, stringy conjunctival discharge, a careful history of the previous diet is an aid in diagnosis.

PROPHYLAXIS

It is apparent that the prevention of A-avitaminosis depends upon two factors: the supplying of a sufficient quantity of vitamin A value in the diet of an infant and the proper absorption of this factor. How much vitamin A is necessary for the maintenance of normal growth and health in the child? We have as yet no definite knowledge of the amount of vitamin A in the diet requisite for health. However, several investigators have made measurements of the minima for different species of laboratory and domestic animals and these might be regarded

as offering suggestion. Cowgill[39] suggests that at least 400 international units per 100 calories per day is necessary for a child. This is based on the consideration of the maximum amount of vitamin A ever found in human milk and the idea that this might be nature's suggestion of an appropriate intake for the infant. This would lead one to assume that the ordinary diet contains sufficient vitamin A when cow's milk, butter, eggs, and certain vegetables and fruits are included. One must remember, however, that cow's milk may have a seasonal variation in its vitamin content dependent upon the diet of the cow. Since cow's milk runs about one-tenth to one-quarter of vitamin A value as compared with human milk and cow's milk is the chief component given babies, it is obvious that there is justification of feeding vitamin A to the infant. The administration of one to two teaspoonfuls of standard cod-liver oil daily, will amply protect against any vitamin A deficiency no matter what the child's diet.

Vitamin A deficiency in the albino rat is known to result in an increased liability to infection, especially to the respiratory tract, the urinary tract, and of the eyes. Several clinical experiments have been carried out by Wright and others[40] on groups of infants in institutions in an attempt to prevent upper respiratory infections by the use of large doses of vitamin A. No appreciable reduction of these infections was noted. The results suggest that the administration of an excess of this substance does not afford an increased protection in children against infections of the respiratory tract. It is apparent that the deficiency in the human is probably due to multiple factors.

Although the infant receives the proper amount of vitamin A value, it may not be absorbed into the system normally. Hence it cannot be stored for future use. Wendt[41] and Abelin[42] show that overactivity of the thyroid is associated with increased need for vitamin A. Cowgill points out that the dietary factor is fat soluble, and, when any inability to utilize fat properly is encountered as in gastrointestinal disorders involving jaundice, steatorrhea, and related conditions, some risk of failure of vitamin A absorption is incurred. Frequently the gastrointestinal tract has been upset by some type of toxin or emotional stress, and it is necessary to remedy the situation before the vitamin A can be absorbed.

TREATMENT

Patients suffering from this deficiency disease should be treated with a form of vitamin A that can be completely utilized. In the mild cases it may seem sufficient to include in the diet a moderate amount of cow's milk; however, in view of the relatively small content of vitamin A in cow's milk as contrasted with good human milk, this may well be questioned. Supplements of butter, eggs, liver, and certain vegetables

including spinach, carrots, lettuce, green beans, and tomatoes are important. The diet should be enriched by the use of cod-liver or halibut oils, both of which contain the vitamin in high concentration. I have been surprised to find that many of my clinical colleagues are unaware that there is a United States Pharmacopeia standard for cod-liver oil. Such an oil should contain not less than 600 units of vitamin A and 85 units of vitamin D per gram. Since many inferior oils are offered for sale, the wise clinician will make certain that only an assayed oil with units stated on the label is used. When cod-liver oil is not tolerated, the cod-liver oil concentrates are valuable. Some clinicians use carotene in these cases. It is possible in urgent cases where the digestion will not tolerate these substances, to administer vitamin A by an intramuscular injection of a cod-liver oil concentrate. In the advanced cases which occur so frequently in infancy, the digestion is often disordered and this must be treated carefully in order to allow the proper absorption of the vitamin A administered.

Thus far we have been speaking of vitamin A, but it is unlikely that any dietary deficiency seen by a clinician represents the lack of just one vitamin. If we grant this general point of view, it is obvious that we should take pains to see that adequate amounts of the other vitamins are provided. This is particularly true of the water-soluble B complex vitamins. A wealth of clinical literature points to the importance of vitamin B in pediatric practice. When immediate results are paramount, parenteral injections of synthetic vitamin B are beneficial. The pure substance is now available in crystalline form. Ocular disturbances require proper local treatment. Secondary infection has a distinct influence upon the degree of corneal damage so that an oculist should be asked to treat the condition.

The night blindness disappears within a few days after the administration of vitamin A. The xerosis of the conjunctiva and the keratomalacia heal in several weeks if the infant survives for that period, and with the improved nutrition of the eyeball the associated infection clears up. Kidney lesions, as a rule, are difficult to handle for when damage is produced to the epithelium of the tubules, vitamin therapy alone is not sufficient.

CONCLUSION

Parents of today have come to realize that proper care is necessary to assure healthy children. They have also been quick to learn that the pediatrician alone can be trusted for responsible guidance. Most parents are anxious to give their newborn infants every opportunity to develop in a healthy normal manner, and they will avail themselves of every opportunity for enlightenment. We are now entering an age of understanding, and physicians who treat infants must be prepared to give instructions in all phases of infant hygiene. It would be well to point

out to the parent that what the child eats is good for the adult, and it is easier for the adult to adapt himself to the child's diet than the other way around. Although a child's dietary requirements qualitatively are not different from those of an adult, the growing organs nevertheless need more vitamins and other dietary factors to permit growth and development.

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THE COMPARATIVE VALUES OF VARIOUS CARBOHYDRATES USED IN INFANT FEEDING

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TO BE of value to the infant, a carbohydrate must be so well tolerated that it will not cause digestive disturbances, must be easily absorbed from the digestive tract, and must be readily utilized by the body tissues. Clinical studies can be used to evaluate differences in effects upon digestion, but they are not adequate to distinguish between relative absorption values for the various types of carbohydrates.

In order to compare differences in absorption of the common carbohydrates used for infants, the present investigation has included extensive blood sugar tolerance studies. It is known that blood sugar is not an absolute criterion of sugar absorption since the level of sugar in the blood is affected also by the rapidity of its removal from the blood (Folin, 1922) and by the amount of sugar released to the blood from the liver (Soskin, 1936). It is obvious, however, that the blood sugar level is greatly influenced by the rate of sugar absorption, particularly immediately following sugar ingestion, so that the blood sugar curve in some measure does reflect the degree of utilization.

Although a fairly large number of blood sugar studies have been reported, the literature contains records of but few controlled studies on infants. Tisdall, Drake, and Brown (1925) comment that conflicting values among the early reports for the fasting level of blood sugar in infants are the result, aside from errors in methods, of a lack of appreciation of the interval of time required for the blood sugar to have attained a fasting level after a preceding feeding. They conclude that the average fasting blood sugar concentration in normal infants usually does not vary more than from 0.075 to 0.095 per cent. MacLean and Sullivan (1929), in reviewing the literature dealing with sugar tolerance studies, emphasize that another reason for conflicting results has been the lack of normal controls. They state that Brown (1925) had done the most comprehensive work to date because he had employed an appreciable number of normal infants as controls.

In spite of conflicting results, however, certain general conclusions may be drawn. These are well summarized in a comprehensive review on absorption and utilization of carbohydrates by Pierce (1935), in which he states that infants have the same type of blood sugar curve as adults except that it is flatter. He also states that the differ-

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ent sugars are absorbed at different rates, disaccharides always being absorbed more slowly than monosaccharides (with the exception of fructose).

Rumpf (1924) has studied the difference in response between infants and adults in detail. He believed that the blood sugar level was a function of age, the older individual having the higher blood sugar level, since the young organism has a greater assimilatory power for sugar than the older organism.

Greenwald and Pennell (1930) have presented the best comparison of results with different sugars for infants. They administered a uniform amount of sugar to each of sixty infants. The level of 2 gm. of sugar per kilogram of body weight which they chose is comparable to levels which have been used for adults and is nicely above the level of 1.3 gm. which Rumpf stated was necessary to produce a distinct alimentary glycemia in infants. Greenwald and Pennell administered their sugar in 20 per cent aqueous solution, the concentration being well chosen (1) to avoid the effects of introducing too much diluent and (2) to have sufficient water to facilitate maximum rates of absorption. Dextrose, saccharose, lactose, and dextrimaltose were each given to fifteen infants aged 2 to 10 days, and the blood sugar was determined after 30, 60, and 120 minutes. Absorption was nearly the same for all the sugars with but slight differences in relative rates, dextrose being absorbed most rapidly and dextrimaltose most slowly. A criticism of Greenwald and Pennell's work might be that they used different infants for the different sugars and did not repeat a sugar test on any infant. Thus individual differences may have materially affected the average results to give the flat type of curves which do not represent the wide range of maximum figures which were reported in their data.

EXPERIMENTAL PROCEDURE

The sugars chosen for investigation in this study were: the monosaccharides—glucose and levulose (two forms of glucose were used, a chemically pure dextrose and cerelose*); the disaccharides—sucrose and lactose; and the sugar combinations—dextrimaltose, karo corn syrup, and honey. Two gm. of these sugars per kilogram of body weight were administered in 20 per cent solutions, allowance being made for the water content of karo and honey. Two series of children were used to determine the effects of the various sugars, four children from 7 to 13 years of age, and nine infants ranging in age from 2 to 6 months. Fasting blood was obtained from the older children 12 hours after the preceding meal and from the infants 6 hours after the last feeding. The older children were quite normal, being in the hospital for orthopedic treatment, while the normal infants were hospitalized only for these

*Cerelose is prepared from corn syrup by the Corn Products Sales Company.

TABLE I

AVERAGE BLOOD SUGAR VALUES OF INDIVIDUAL CHILDREN FOR THE VARIOUS CARBOHYDRATES

KIND OF SUGAR	SUBJECT	NO. OF TESTS	MG. OF SUGAR PER 100 C.C. BLOOD (MIN.)						MAXIMUM LEVELS					
									RANGE	NUMBER MAXIMA AT				
			0	15	30	60	90	120		15	30	60	90	120
			Infants											
Dextrose	Myles	3	78	110	135	132	110	114	138-145	1	1	1		
	Ned	2	86	122	134	116	111	105	118-150		2			
	Kermit	2	87	114	129	107	97	96	122-136		2			
Cerelose	Hal	4	91	96	115	119	121	102	126-132		2		2	
	John	3	89	117	131	105	104	97	127-139	1	2			
	Bart	3	86	107	122	107	108	107	109-146		2			1
	Rob	3	87	105	121	108	99	90	119-132		2	1		
	Ned	2	92	112	139	140	115	88	138-148		1	1		
	Myles	2	92	100	118	144	118	125	140-148			2		
	Kermit	2	91	106	109	105	96	97	111-120		1	1		
Levulose	Hal	4	88	90	104	115	121	103	112-129			1	3	
	John	3	90	99	116	114	109	94	109-123		1	2		
	Rob	1	85	87	110	117	107	99	117			1		
Sucrose	Ned	1	92	112	120	104	129	98	120		1			
	Myles	1	88	117	135	127	91	95	135		1			
	Raymond	1	77	98	108	95	82	83	108		1			
	Noel	1	82	92	97	99	98	99	99			1		
Lactose	Ned	2	76	95	114	97	93	83	103-125		2			
	Myles	2	79	94	109	101	111	82	109-120		1	1		
	Raymond	2	78	84	90	127	79	84	90-168			2		
	Noel	2	84	90	95	97	98	103	98-108					2
Dextri-maltose	Ned	3	88	127	158	136	101	90	153-168		2	1		
	Myles	3	87	106	150	152	105	98	148-170		1	2		
	Raymond	2	83	98	102	93	92	80	99-104	1	2			
	Noel	2	88	94	100	105	118	112	116-122				1	1
Karo	Ned	2	87	113	152	140	145	89	144-159		2			
	Myles	2	83	99	135	128	92	93	134-137		1	1		
	Raymond	2	83	102	120	119	96	81	116-130		1	1		
	Noel	2	92	94	102	118	97	111	108-128			2		
Cartose	Hal	2	91	118	158	153	101	93	148-167		2			
	John	7	80	102	109	108	88	85	92-130	1	2	3		
	Kermit	1	76	95	122	111	86	92	122		1			
Honey	Hal	5	92	98	118	133	106	106	120-152		2	3		
	John	6	88	126	138	102	102	92	125-152		5	1		
	Bart	1	92	105	132	123	99	99	132		1			
	Myles	3	86	99	135	112	99	97	116-150		3			
	Ned	3	88	123	146	105	99	95	130-156		3			
	Noel	2	85	91	95	102	114	124	116-131					2
	Raymond	2	82	116	128	135	97	82	118-140	1	1			
			Children											
Cerelose	E. S.	3	110	163	176	182			165-196	1	1	1		
	F. C.	3	97	131	173	180			156-200		2	2		
	V. B.	3	100	134	163	166			167-184		2	1		
	M. H.	3	94	138	165	133			160-170		3			
Levulose	E. S.	2	87	107	110	103			111-112	1	1	1		
	V. B.	1	92	97	105	104			124		1			
Honey	E. S.	3	100	135	170	171			171-174		1	2		
	F. C.	3	96	153	166	172			167-185		1	2		
	V. B.	3	96	152	159	134			145-175	1	3			
	M. H.	3	101	148	185	139			179-189		3			

sugar studies. Sugar solutions were quickly consumed immediately after the fasting blood was drawn, with subsequent blood samples being taken at 15-, 30-, and 60-minute intervals for the older children, and at additional intervals of 90 and 120 minutes for the infants. The 15-minute samples were included to ascertain the early effects of absorption. The tolerance for each sugar was measured by repeated determinations with the same individual, the same individual being again used for investigations of other similar sugars. The technic described by Folin (1928) was employed for all of the sugar determinations. The average results and the range of maximum values for the different individuals are recorded in Table I, while averages for the different sugars are in Table II.

TABLE II

AVERAGE BLOOD SUGAR VALUES OBTAINED WITH DIFFERENT SUGARS

SUGAR	NO. OF TESTS	MG. OF SUGAR PER 100 C.C. BLOOD (MIN.)					
		0	15	30	60	90	120
		Infants					
Dextrose	7	84	115	133	118	106	105
Cerelose	19	90	106	122	118	109	101
Glucose*	26	88	109	125	118	108	102
Levulose	8	88	92	110	115	112	99
Sucrose	4	85	105	115	107	100	94
Lactose	8	79	91	102	106	95	88
Dextrimaltose	10	87	106	128	122	104	95
Karo	8	86	102	127	126	108	94
Cartose	10	82	105	130	124	92	90
Honey	22	88	108	127	116	102	99
		Children					
Cerelose	12	100	142	170	171		
Levulose	3	100	111	117	111		
Honey	12	98	147	170	154		

*Average of individual averages for both dextrose and cerelose.

DISCUSSION OF RESULTS

An outstanding result at once apparent was the distinct difference in individual response. John, for example, reached maximum levels at least 15 to 30 minutes before Hal, while Noel had maximum values delayed an equal amount of time later than Hal. Myles had a more bell-shaped curve with nearly a plateau from 30 to 60 minutes, whereas Ned had a much sharper peak at 30 minutes. If data for these infants were averaged, a series of flat curves would result which would show but little differentiation between the various types of sugars. Therefore, to present a more clear-cut picture of the data, the curves of various individuals are charted in Fig. 1. In addition, average values for the different sugars are charted in Fig. 2.

Although a certain degree of fluctuation existed, in general an individual maintained his type of sugar curve throughout the study. The difference between individuals was probably due to pyloric activ-

ity. Adam (1924), giving barium sulfate with sugar solutions, observed delayed emptying time of the stomach in certain cases. Holtz and Schreiber (1930), who also used barium with sugar, observed a complete closure of the pylorus for intervals as high as twenty minutes during the period of sugar absorption.

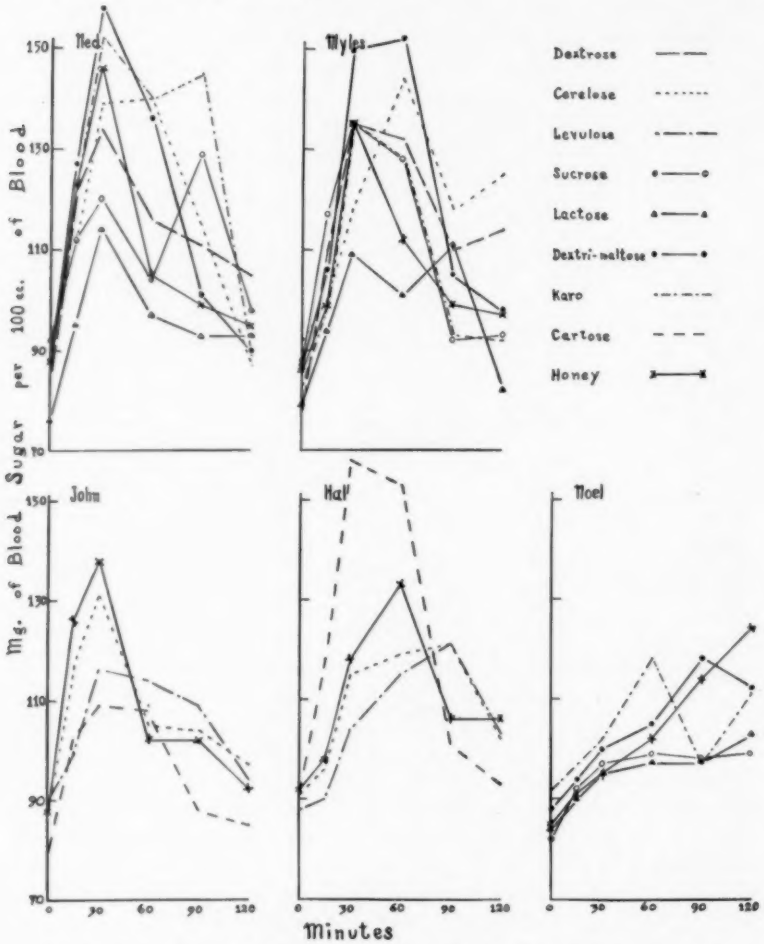

Fig. 1.—Average blood sugar values of individual infants for various sugars.

As was expected from the observations by previous investigators, glucose was absorbed far more rapidly than was levulose. This was particularly true with the older children where average maximum values varied from 176 for glucose to 116 for levulose. The infants, however, gave values for glucose considerably lower than were ob-

tained with the older children, while the levulose curves for the two groups were quite comparable. The maximum blood sugar level reached by infants who were fed glucose was 131 as compared to 120 for levulose. Apparently glucose is tolerated better in infants than in older persons, but levulose is less affected by difference in age. An

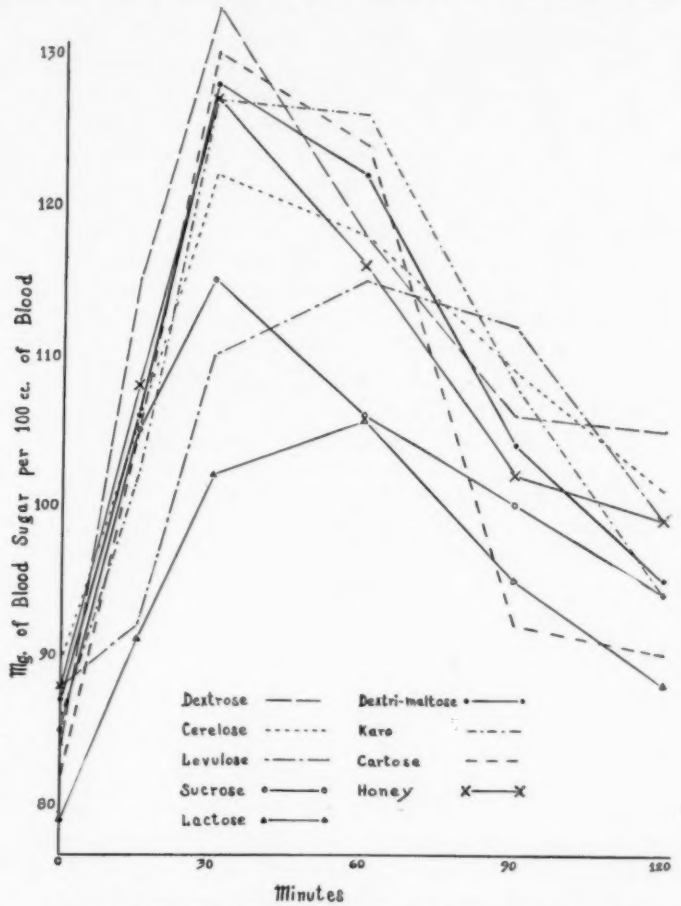

Fig. 2.—Average values of all infants for the various sugars.

unexpected difference was also encountered with the two forms of glucose since the chemically pure dextrose gave a higher blood sugar curve than did cerelose. While this difference was slight, it was observed consistently with the different infants.

The disaccharides fed to the infants conformed to anticipated results in that both sucrose and lactose gave lower blood sugar curves than glucose. Lactose, however, with average maximum values of

only 108, gave curves which were definitely lower than those for levulose. This was in contrast to the conclusion reported by Pierce. It may be that levulose curves, as compared to levels of blood sugar obtained with other types of sugars, are relatively higher for infants than for older persons. Most of the figures for levulose in the literature are based on work either with older children, adults, or animals.

Dextrimaltose was administered to four infants. With two of the four it gave higher values than were obtained with any other sugar, and with the third the maximum for dextrimaltose equaled the other two highest maxima which were obtained with karo corn syrup and honey. Greenwald and Pennell stated that dextrimaltose gave lower results than any of their other sugars. Perhaps there was a difference in the kind of dextrimaltose used in the two experiments. Malyoth (1933) has stated that stereochemical structure is important in the selective absorption of carbohydrates. He reported better weight curves for infants fed dextrimaltose made by enzymes from Aspergillus than resulted when a malt amylase had been used in preparation of the dextrimaltose.

With karo corn syrup relatively high curves were obtained in all cases. In general the karo curves conformed quite closely to the curves for dextrose. Presumably the karo corn syrup used contained a high percentage of glucose. A corn syrup from a different source* gave somewhat lower results than did the karo, although in one case (Hal) an exceptionally high curve resulted which did not even conform to the type of curve exhibited at all other times by this infant.

Very interesting results were obtained with honey. Its glucose content (about 35 per cent) is apparently a dextrose which is absorbed most readily. Out of eleven infants and children receiving honey, with five, honey gave the highest values of any sugar at the end of 15 minutes, and in three others honey ranked second at the end of this first interval. When average values were compared, honey was second to dextrose in its rate of absorption immediately following ingestion. Honey, however, did not yield the high maxima at 30 or 60 minutes which characterized dextrose, karo, or dextrimaltose. Thus, although honey contains a sugar which is readily absorbed so that it enters the blood stream more rapidly than any other sugar, it does not flood the organism with exogenous sugar. It was frequently observed that after high peaks of blood sugar following glucose ingestion, a swing occurred to levels even below those for fasting. This was presumably due to the fact that too high a level of blood sugar from exogenous sources, because it stimulates sugar oxidation and storage mechanisms and because it decreases glycogenolysis, may lead to a hypoglycemic condition. Honey, therefore, would seem to have a distinct advantage for infants in its glucose content.

*Cartose, prepared by Scientific Sugars Co.

Another advantage of honey may be found in its levulose content (about 40 per cent). It has been demonstrated that levulose is easily absorbed by infants. Following levulose ingestion, the blood sugar does not rise as rapidly as following dextrose, but maximum levels are reached by 60 minutes which nearly equal the dextrose levels for that time. At 90 minutes, the levulose level for infants is higher than the blood sugar level following dextrose administration. Thus levulose is able to maintain blood sugar levels. The combination of glucose and levulose in honey is reflected in the honey blood sugar curves which rise rapidly to only relatively high maxima and then fall steadily, but slowly, until fasting levels are again reached.

In regard to the utilization of honey, the work of Carpenter and Lee (1932) may be significant. They have demonstrated that respiratory quotients following levulose ingestion rise to high levels at a much more rapid rate than occurs with dextrose. The respiratory quotients after dextrose have a delayed rise. Thus we can conclude that levulose is rapidly utilized by the body, whereas dextrose is utilized more slowly. This could possibly be interpreted as an advantage for honey, which contains both types of monosaccharides, and would suggest its value as a carbohydrate addition to the infant's dietary.

SUMMARY

The monosaccharides—glucose and levulose; the disaccharides—sucrose and lactose; and the sugar combinations—dextrimaltose, karo corn syrup, and honey have been compared as to their value in infant feeding. One hundred twenty-three blood sugar tolerance curves were determined following administration of 2 gm. of sugar per kilogram of body weight to four children aged 7 to 13 years and to nine infants aged 2 to 6 months.

Fasting blood sugar ranged from 87 to 110 for the older children and from 76 to 92 for the infants, with average values of 97 for the children and 86 for the infants.

Although considerable difference in rates of absorption was encountered between results from different individuals, an individual in general maintained a certain type of blood sugar curve. The relative differences in results between kinds of sugars also remained comparable for the various individuals. Repeated tests with the same individual were considered to have an important effect upon the validity of the data.

The infants had a greater tolerance for glucose than did the children, while levulose gave somewhat similar results for the two age groups.

Glucose, dextrimaltose, and karo gave the highest blood sugar curves, with honey, sucrose, levulose, and lactose next in order.

Honey appeared to have special advantages for infants because, with the exception of dextrose, it was absorbed most quickly of all the sugars tested during the first fifteen minutes following ingestion, yet it did not flood the blood stream with exogenous sugar. It also maintained both a steady and a slow decrease in blood sugar until the fasting level was again reached. With its easy and widespread availability, palatability, and digestibility it would seem to be a form of carbohydrate which should have wider use in infant feeding.

Some of the material used in this study was furnished through the courtesy of Lake Shore Honey Co., The Borden Company, Scientific Sugars Co., Mead Johnson & Company, Corn Products Sales Company.

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SENSITIVITY TO COW'S MILK IN INFANTILE ECZEMA

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OF 126 cases of infantile eczema, 104 *began* before the age of 6 months, 52 before the age of 3 months. At the time of onset most of these infants were eating nothing but cow's milk, orange juice, and fish oil. Milk as a possible causative factor deserves serious consideration.

In 1925 Dubois, Schloss and Anderson[1] found that commonly when an infant is first given cow's milk there is absorption of unsplit lactalbumin, as shown by the presence of precipitin in the blood and a positive intracutaneous skin test. In none of their patients was there a positive scratch test. The presence of the blood precipitins and the positive skin tests was of short duration only, and in no case were there any allergic symptoms.

Since this time it has been shown by a number of investigators that many persons develop positive intracutaneous tests and blood precipitin when injected repeatedly with foreign protein with which they have not before come into contact. The degree of sensitivity is never high, the precipitin formation is transitory, and no allergic symptoms are produced. Such antibody formation and skin sensitivity is probably best looked upon as a stage in the development of immunity and is the normal reaction of a normal person to foreign protein. It does no harm to the individual. Certain persons, who have been called *atopic,* may react differently when they come into natural contact with foreign protein. Their degree of sensitivity is higher, and they develop symptoms. They may give positive scratch as well as intracutaneous tests and usually have permanent transferable antibodies in the blood. The normal reaction has for some reason been distorted and intensified, to the detriment of the individual. Whether this difference of reactivity is due entirely to heredity, as some investigators believe, whether it is due to other variables being present at the time the foreign protein is introduced, or to the size of the first dose of protein, is an open question. Of that heterogeneous collection of dermatoses called infantile "eczema," about 75 per cent are atopic, and a good name for this group is atopic dermatitis.

One might expect that scratch tests to milk protein would usually be positive. Such, however, is not the case. Of a series of 153 infants tested, under one year of age, only 17 per cent gave positive reactions.

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Up to a year and a half ago we used the scratch test exclusively and were often confronted by the following situation:

A baby who began to have eczema when he was eating nothing but cow's milk gave positive scratch tests to egg only, which he had never eaten. He gave negative scratch tests to all other foods, to a number of foods which cows eat, such as alfalfa, corn, soy bean, cottonseed and beets, and to environmental allergens such as silk, feathers, and dust. Not infrequently, however, in spite of his negative milk tests, he could be improved or cured by a milk free diet. We were much puzzled by this group of patients, until we began to use the intracutaneous test.

We have done, on a series of 64 eczematous infants under one year of age, all of whom had given negative scratch tests to milk, intracutaneous tests with a 1:100 and a 1:10 dilution* of whey (Lederle). A 1:10 dilution of goat's milk whey made up in the same diluting fluid was used

Fig. 1.

as a control in 53 of these patients. Forty per cent gave positive tests to the 1:100 dilution, 56 per cent to the 1:10 dilution, and 15 per cent to the goat's milk lactalbumin.

As a rule, skin tests in infants are not so large as those in adults. This was true of the patients in this series, and there were only occasional large reactions with pseudopods. No test was called positive unless the wheal was at least 0.5 cm. in diameter. There were very few doubtful reactions: in almost all of those tests called negative, there was practically nothing to be seen, except a slight redness at the point of insertion of the needle. A typical positive test of moderate degree with negative control is shown in Fig. 1.

In 8 patients the blood was tested for reagins by the indirect method (passive transfer to the skin of a normal individual). Reagins were present four times, absent four times.

In order to compare the reactions of the eczematous infants with those of a series of infants who had no allergic symptoms, 50 such infants of the same age group were tested with 1:100 and 1:10 cow's milk whey.

*Equivalent to a 1 to 1,000 lactalbumin dilution.

All of these infants had been taking cow's milk for a considerable period of time, as had those in the eczematous group, therefore they are a somewhat different group from Dr. Schloss' babies.

There were no reactions to the 1:100 dilution, and only 5 to the 1:10 dilution.

It is shown, then, that a large proportion of allergic eczematous infants have a specific skin sensitivity to the lactalbumin of cow's milk, as determined by the intracutaneous test, and that infants without allergic symptoms rarely do, provided they have been drinking cow's milk for a considerable period of time.

This, however, may not necessarily mean that in the eczematous group the sensitization is of etiological significance. It has been our experience that a positive scratch test to milk usually has this significance. Does the same hold true of the intracutaneous test? If it is of etiological significance, the eczema should improve when cow's milk is withdrawn from the diet.

Three measures have commonly been used when sensitivity to cow's milk exists. The first is the use of heated milk: evaporated milk (which has been heated to 116° C. for 15 minutes), or a proprietary preparation which has probably been heated hotter and longer. All available evidence indicates that casein is not rendered any less allergenic by heating. Therefore if sensitivity to casein exists, there is no reason to believe that heated milk will do any good. It is not known how common casein sensitivity is because almost all casein preparations, unless very specially purified, contain traces of lactalbumin, and no large series of cases has, as far as we know, been tested with a purified preparation. Casein sensitivity is generally thought to be uncommon. However, from unfinished work now in progress, which we hope to report later, it seems that sensitivity to casein may be much more common than has been supposed.

The allergenic power of lactalbumin is somewhat reduced, but by no means obliterated, by heating. There is therefore some reason for feeding heated milk if there is sensitivity to lactalbumin alone. In spite of this, in eczematous infants with lactalbumin sensitivity, we have not often seen improvement follow the use of heated milk. It is undoubtedly true that an occasional patient with allergic symptoms due to milk may be able to take heated milk with impunity. We believe this to be the exception rather than the rule in eczema, and we do not rely on heated milk in the treatment of our milk-sensitive patients. We do, however, prefer it to fresh milk.

One wishes that goat's milk were consistently a cure for eczematous infants with milk sensitivity. Unfortunately it is only occasionally so. If casein sensitivity is present, there is no reason why goat's milk should do any good, for goat's milk and cow's milk casein are biologically

similar, if not identical, and, when one substitutes goat's for cow's milk in a patient with casein sensitivity, he is merely using the same protein under a different name. This was emphasized by Schloss years ago. The lactalbumins of the two milks are biologically dissimilar, although even here crossed reactions are not uncommon.*

In spite of these objections, it has been our experience that goat's milk gives better results than heated cow's milk, and if lactalbumin sensitivity alone exists, goat's milk may be useful. We have the impression that it is more likely to be of service in the very severe cases of milk idiosynerasy in which the patient goes into collapse when he takes even a few drops of cow's milk than it is in eczema. We have not seen enough of these rather unusual cases to be able to present any statistical data of value.

For all these reasons, as well as from a considerable practical experience, we prefer to do away with milk entirely if milk sensitivity exists and if the eczema is of any severity, provided, always, that the infant is in a good state of nutrition.

We have recently fed 19 eczematous infants under one year of age who gave negative scratch tests but positive intracutaneous tests to milk on a milk-free food (Sobee). In 14 of these, improvement or apparent cure was so striking that there seemed no question that sensitivity to cow's milk was of primary etiological importance, in spite of the negative scratch tests.

It is very difficult to evaluate the efficacy of any therapeutic procedure in infantile eczema. Temporary remissions are so frequent, relapses are so common, and so many extraneous factors have an influence on the course of the disease, that any statistics dealing with therapeutics are never very reliable. For these reasons I very much dislike to speak of a "cure" in infantile eczema although I do not mean to imply that cures do not occur.

The failures in this series were for the most part in the most severe cases, with the picture of erythroderma, and it has been our experience that a milk-free diet is not likely to do much good in these cases, although most of them give positive intracutaneous tests to milk. Possibly there is present some undetermined sensitivity, possibly some entirely different added factor of which nothing is known. At any rate, treatment is not at all satisfactory.

It would be entirely incorrect to assume that sensitivity to cow's milk is always the cause of atopic infantile eczema, or that it can consistently be cured by a milk-free diet. Most of these infants are sensitized also to other things, particularly wheat, goose feathers and house dust, and some do not do well no matter what apparently offending allergens are removed from the diet or environment. There is still a great deal to it that is very hazy and obscure. But the evidence indicates that milk

*Work soon to be published by L. W. H.

sensitization is the most important factor in many of them, and that they can be helped if milk is removed from the diet. They are taking enormous quantities of an allergen to which they are sensitive, furthermore, an allergen which passes the intestinal mucosa with ease. The sensitivity is of low degree; the effect is cumulative rather than acute. The skin is sensitized, to be sure, but testing with concentrated solutions by the intracutaneous technique may be necessary to produce positive tests, and it takes some time to develop symptoms after the sensitivity has been once produced.

The gradation between the normal and the abnormal is not a sharp one; there are all degrees from the normal milk sensitivity acquired by Dr. Schloss's babies, of transitory duration only and with no symptoms, to the permanent sensitivity of high degree, which is fixed in the patient to many allergens and which cannot be dislodged by any means at present at our command. In most cases of infantile eczema of ordinary severity, the degree of sensitivity lies between these two extremes; it is a phase which some infants enter when foreign protein has penetrated their blood streams. Many with milk sensitivity pass through this phase in a few months and gradually acquire immunity—their immune reactions again resume the normal course; others as they come into contact with new proteins either by mouth or by inhalation, may develop permanent sensitivities to them in addition to those which they already have, may continue to have eczema, and may later develop asthma or hay fever.

Why in this so-called atopic group the normal reactions become perverted and a clinical sensitivity detrimental to the individual appears is a question which is at present unsolved.

CONCLUSIONS

A large number of eczematous infants are sensitized to the proteins of cow's milk. The number is much greater than is indicated by the commonly employed scratch test.

Heated cow's milk and goat's milk are not so likely to produce good therapeutic results as is a milk-free diet.

A milk-free diet is not always successful, in those patients who give positive intracutaneous but negative scratch tests to milk. This indicates that such sensitization is not always of etiological significance.

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ALLERGY IN CHILDHOOD

I. The Modes of Its Acquisition

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OUR knowledge of the allergic diseases has developed along experimental and clinical lines. A number of theories have been adduced to explain the underlying basis for the reactions which characterize them. The antigen-antibody theory has received the widest acceptance.

By it, we understand that a foreign substance, antigen, which in and of itself is harmless when given to an animal for the first time, may produce allergic phenomena upon subsequent administration if an adequate interval elapses because of its interaction with specifically related antibody which has been elaborated in the interim. The cellular concept of the antigen-antibody reaction is that their union occurs not in the circulating blood but within the cells of the body. The specific antibodies are fixed in great measure to the smooth muscle cells. Their union with antigen produces cellular irritation with concomitant spasm of the sensitized tissue. These spastic constrictions are revealed in various ways depending upon the quantitative distribution of smooth muscle in the organs, which varies markedly in the different animal species, as well as in the individuals of the species. Hence, anaphylactic syndromes may be due to a spasm of the bronchioles which results in asphyxia, as occurs in the guinea pig; or it may be due to constriction of the hepatic venules, characteristic in the dog, which results in portal congestion, hemorrhage from the bowel, and a marked fall in systemic blood pressure. In the rabbit the disturbed physiology is due to a constriction of the pulmonary arteries.

One marvels that such widely divergent manifestations can be initiated by the simple mechanism of tissue irritation. These bizarre expressions are present in the human being as well, in whom we recognize them as asthma, hay fever, gastrointestinal disturbances, vasomotor and dermal manifestations, and the more serious fatal outcomes which may follow the pattern of the guinea pig, the dog, or the rabbit.

Long before anaphylaxis in the animal was discovered, physicians were familiar with idiosyncratic diseases; Hippocrates described idiosyncrasy. Von Pirquet coined the term allergy[1] to describe the hypersensitive reactions observed with sera and infectious agents in man. This term, as commonly employed, has been broadened to include altered or hypersensitive reactions to food, animal emanations, pollens, and drugs, observed both in man and in animal.

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Because there were certain differences which in the beginning seemed irreconcilable, there were some who maintained that the experimental and clinical forms of hypersensitiveness differ basically and so should be distinguished one from another. The term "atopy" was devised for certain allergic or hypersensitive conditions in man; the exciting agent is an "atopen," and its specifically related interacting substance is the "atopic reagin."

Prausnitz and Küstner[2] discovered that antibodies found in the blood of allergic individuals could be transferred to the skin of normal persons. Though the Prausnitz-Küstner antibody and the anaphylactic antibody may have certain characteristic differences, recent work tends to show that it is most unlikely that they are without a fundamental relationship. A number of investigators have been able to sensitize animals passively with the blood of allergic patients. Cooke and Spain[3] reported the transfer of antibodies from rabbits sensitized to egg white to the human skin. Levine and Grove[4] sensitized a monkey with the blood from a human hay fever sufferer. While they minimized the importance of this particular experiment, the fact that they succeeded in one instance out of four would seem to indicate that the so-called atopic reagin may act in a manner similar to the anaphylactic antibody. Instead of inferring, as they have, that if a larger series were carried out further negative results would be obtained, one might as well conjecture that in a larger series more positive results would be obtained.

More recently, the problem has been reinvestigated by Caulfeild and his associates.[5] They found that the skin of the monkey is suitable for local passive sensitization (Prausnitz-Küstner technique) not only with the serum of a guinea pig sensitized to ragweed pollen, but also with the serum of a human case of ragweed hay fever.

We too have presented certain evidence[6] showing that antibody in the serum of a guinea pig sensitive to horse dander could sensitize the human skin, and the same serum passively sensitized normal guinea pigs.

If the antibody found in sensitized man can produce allergic manifestations in both man and animal and if the antibody found in the sensitized animal can induce equivalent reactions in man and animal, a basic relationship between these antibodies would seem to be established. It is difficult for me to believe, therefore, that allergy in man is entirely dependent on a special mechanism which is unique and unrelated to the mechanism which produces the anaphylactic phenomenon in the animal.

During my early years in the laboratory, it occurred to me that anaphylactic phenomena observed in the animal had generally been induced through the medium of injection, and this procedure made it appear, at least superficially, that the manner in which the animal

acquired its sensitization differed from that in which the human being developed his sensitivity. I reasoned, therefore, that if animal experiments could be devised to simulate human conditions, we might be able to study those manifestations of protein hypersensitiveness which we observe as clinical entities in the human being. The natural way in which allergens enter the human body, as contrasted with the artificial injection of sera, is usually either by ingestion or inhalation. It was these conditions that we sought to duplicate.

Our first series of experimental studies brought into question the sensitization of the newborn, suggested by the work of Wells.[7] We showed that the guinea pig fetus can be sensitized both actively and passively; first, by injecting females with antigens during pregnancy;[8] second, by inducing experimental asthma through inhalation in pregnant animals[9]; and third, by feeding pregnant guinea pigs protein foods foreign to their diet.[10] Hypersensitiveness thus acquired *in utero*, we have designated congenital allergy. It is acquired by the fetus during intrauterine life; it does not result from any character carried by the germ plasm and must, therefore, be carefully distinguished from germinal inheritance. Later, we demonstrated[11] that the human fetus can be actively sensitized to protein-containing foods ingested by the normal woman during pregnancy and that the human fetus can be passively sensitized in utero through antibodies present in the blood of an allergic mother.[12] It is this, we believe, which explains *some* of the cases of infants who manifest allergic symptoms upon taking a food for the first time. I emphasize "some," because I wish to make it clear that I have at no time proposed that all cases of allergy can be attributed to sensitization acquired *in utero*. My thesis is that individuals can be sensitized at any time if certain conditions are fulfilled. In the studies here referred to, I have described such conditions during the intrauterine period.

We do not find it strange that some should have been tempted to the conclusion that the hypersensitiveness of the newborn is entirely due to constitutional factors, in the absence of evidence to show that the first contact may occur in utero, after germination and before birth.

The question of the passage of proteins through breast milk, which has been suggested as an explanation for sensitization of the newborn, still remains moot and controversial. We have been unable to find such an influence in our experimental work with guinea pigs.[8] Stuart[13] and Smyth and Bain[14] were also unable to find conclusive evidence for demonstrating a causal relationship between sensitization of the newborn and the passage of proteins through breast milk.

The mechanism of sensitization through the intestinal tract and the respiratory tract will next be considered. The experimental evidence

of Rosenau and Anderson,[15] Richet[16] and Nobécourt[17] in animals; the work of Schloss and his associates[18] with children, all indicate quite clearly that native proteins can enter the blood stream through the gastrointestinal wall and thus give rise to sensitizing antibodies. The importance of the passage of native proteins through the gastrointestinal wall is exemplified by the reports of some French investigators,[19] who related that the ingestion of horse meat so sensitized certain individuals that, when they received primary injections of antitoxin derived from horse serum, severe anaphylactic reactions and death ensued.

In our ingestion experiments,[20] we learned that a large proportion of guinea pigs could be sensitized by ordinary oral feeding of milk. The young were more easily sensitized, although animals of all ages reacted. An interesting parallel was obtained in a human being. The skin of a normal 12-year-old child was passively sensitized by the Prausnitz-Küstner technique with the serum of an allergic child sensitive to lactalbumin, and a reaction at the prepared site was obtained after this child drank some milk. This experiment suggests that the ingestion of milk by a normal child may result in the presence of lactalbumin in its blood stream and indicates how reactions may be provoked through ingestion in sensitized individuals. Ingested proteins may, therefore, gain entrance into the blood stream in a native state through the intact intestinal wall with a frequency that is surprising and shows the importance of the intestinal wall as an avenue of invasion for foreign proteins.

Studies on the passage of proteins through the wall of the respiratory tract have given rise to many controversies. The exact point at which antigens pass the wall and enter the blood stream have been variously thought to be the upper respiratory tract, the trachea, and the lung alveoli. Practically all studies have been carried out by employing liquid sprays as inhalants. Such men as Sewall[21] and Alexander[22] and their co-workers have shown beyond doubt that inhaled liquid antigens can sensitize the lower animal.

In our work we used dry antigens. All prior attempts to sensitize animals by having them inhale dry antigens have been reported as failures. We succeeded in showing that the inhalation of dry antigens could result in unmistakable sensitization. We exposed guinea pigs to an environment in which a dry dust (horse dander and castor bean, respectively) was circulated.[23] They withstood their initial contact without any untoward reaction. However, after the lapse of two or three weeks, when they were again brought into this specific antigenic dust environment, they evidenced manifestations which in all respects resembled asthma in the human subject. It must be remembered that injections were not resorted to and that the sensitization and signs were produced solely through the medium of the inhalation of a dry dust. We feel it is not unreasonable to call this

"experimental asthma" because, in all essential details, it is a direct analogy to the dust contact to which hay fever and asthmatic patients are subject.

From these experiments, we were also able to adduce that the quantity of antigen is an important factor.[24] When animals were exposed to the dry dander dust for one-half hour, very few were affected; but, as the time of the exposure was increased up to five and six hours, a majority of the animals became sensitized. Sensitization thus established was either general or local.

Animals which we sensitized to horse dander through inhalation died in anaphylactic shock from a primary injection of horse serum antitoxin.[25] A parallel was thus established to the case of asthmatics sensitive to horse products who either develop severe anaphylactic shock or die when horse serum is administered to them for the first time.[26] It results from a common globulin fraction resident in both horse dander and horse serum.

When faced with the question of the nature of the inherited factor, the proponents of the theory that certain forms of allergic conditions are dependent on inherited factors have been forced to the position that such a question invites useless speculation, because there are still so many unknown factors. For the present, one can state only that what is inherited is the "susceptibility to sensitization." I am aware of the fact that the evidence presented in this paper sheds no light upon this phase of the problem.

Metchnikoff[27] and others observed many years ago that a number of species of animals were insusceptible to certain bacterial toxins which were extremely poisonous for other species.

Longcope and Mackenzie and later Mackenzie and Leake,[28] when they sought to explain the wide range of individual reactivity to injected foreign proteins, and the insusceptibility of certain individuals, even when large amounts of serum were injected, suggested that those who are relatively insusceptible may have some protective mechanism, either in their own blood serum or in the cells, which prevents or delays the union of the antigen with the cells of the body. We still cannot explain this impermeability of the tissue cells to foreign serum, but the fact remains that in some individuals little or no antibody is formed, and, therefore, no sensitization—or sensitization of a very mild character—is established. Therefore, even in serum sickness, which all grant is not an inherited condition, there is great individual variation in susceptibility.

As is pointed out by Zinsser and Bayne-Jones:[29] "It is almost forced upon one to conclude that what is inherited is the capacity for being sensitized, and this is a phenomenon quite common in the animal kingdom, where the energy of antibody production is rarely the same in two animals injected with identical amounts of the same antigen."

Though somewhat differently expressed and approached by way of studies on serologic and allergic reactions with simple chemical compounds, a similar viewpoint has been expressed by Landsteiner.[30]

If human allergy is acquired as anaphylaxis is in the animal, we are confronted with a challenge to explain why some individuals become allergic and others do not. It is not possible to answer this question with finality at the present. There are certain implications in the data detailed above which are slowly becoming understood and which may throw some light on the query.

The evidence presented shows that the placenta, the intestinal tract, and the respiratory tract are not completely impermeable to colloids. Unaltered allergens may, therefore, enter the blood via these portals, and it becomes clear that it is impossible to exclude in any case the possibility that preliminary contact has not taken place.

The organism is provided with certain barriers which prevent the invasion of allergens in their native state into the blood stream. These barriers are the relatively impermeable skin and mucous membranes covering the outer surfaces and body cavities, and their respective tissue juices. Finally, such foreign proteins may be excreted from the body in their original state via the kidney. These barriers are not equally effective in all individuals, nor are they effective to a like extent at all times in the same individual, for the immaturity of the organism, pathologic states, and disturbed physiology may alter them. Therefore, while individuals may be similarly exposed to antigens, it does not follow that these antigens will be similarly disposed of by the body. The alteration of any of the barriers may permit the foreign protein to enter the blood stream directly and generate specific sensitizing antibodies which become fixed to tissue cells. Yet, another factor of significance already mentioned is the individual difference in capacity to form antibodies.

It may be hypothesized that man battles continually against the invasion of foreign proteins; the difference between the normal individual who battles successfully and the allergic who does not, may lie more largely in quantitative than in qualitative considerations, if we grant that quantitative applies to the amount of antigen which actually penetrates the tissue cells and not the amount to which the individual is exposed.

CONCLUSIONS

All individuals are potentially capable of developing allergy. The capacity to become sensitized differs in individuals more largely because of quantitative rather than qualitative considerations.

Antigens or antibodies may be transmitted to the fetus through the placenta. Unaltered proteins may pass through the walls of the digestive tract or the upper respiratory tract. Unaltered allergens may

enter the blood stream by way of the skin, or by parental injection. It is impossible, therefore, to exclude insidious previous invasions of allergens in any given case of childhood allergy.

The acquisition of hypersensitiveness depends upon: (a) constitutional or other factors peculiar to the individual; (b) the nature of the exciting substance; (c) the amount of antigen to which the individual is exposed; (d) the amount of native antigen which actually invades the blood stream; (e) the intervals at which such exposures occur.

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ALLERGY IN CHILDHOOD

II. Prophylaxis

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IN A PRECEDING paper[1] in which the modes of the acquisition of allergy were discussed, we presented the thesis that all individuals are potentially capable of developing allergy.

The clinical picture may be that of any of the well-known syndromes, as well as the less easily recognized forms, which have been assumed to belong in the field of allergy. The entrance of antigens into the blood stream by way of various natural portals or through parenteral injection gives rise to the formation of specific sensitizing antibodies which become fixed to the various organs of the host. The presence of these antibodies in the tissues renders the individual hypersensitive. The allergic response is an expression of the reaction of the sensitized organs when antigen again enters and unites with fixed antibody.

Although an individual is subject to sensitization at any age, the periods of greatest vulnerability appear to be the antenatal period, early childhood, and during illness and convalescence.

An individual can spontaneously become immune to a substance to which he was hypersensitive; or be rendered immune by various methods of desensitization. But, what is more significant, it appears to me, is that the factual and theoretical considerations presented with respect to the acquirable nature of hypersensitiveness suggest certain prophylactic measures that can be adopted which may radically reduce the incidence of allergic diseases.

The subject of prophylaxis in allergy appears to have evoked scant interest. The communication of Peshkin,[2] and the paper of Glaser and Landau[3] are the only two that I have found that treat of this phase as an entity. Peshkin's paper, in the nature of a short report, is illuminating and well worth reading. Glaser and Landau go more fully into the subject, and their material is extremely provocative. In both, there are points which are consonant with some of the views expressed here.

The purpose of this communication is to present suggestions to the pediatrician in the management and care of the normal infant and child with a view to the possible prevention of allergic diseases.

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A. THE PREVENTION OF FOOD SENSITIVITY

1. Congenital Allergy or Intrauterine Sensitization.—The modes of placental transmission have been described in a preceding paper.[1*] The cravings of the parturient mother and her excessive indulgence in certain foods during pregnancy account in part for some cases of food sensitivity in infancy, which to all appearances occur spontaneously after the ingestion of a new food. If the mother herself is sensitive to a food, she may passively sensitize the infant to that particular allergen.

The pregnant woman, therefore, should be taught to limit her protein intake, and she must be warned against the indulgence of any cravings. At times, this excessive intake of a particular food may escape detection. For example, a patient may deny eating eggs in excess, and yet a careful inquiry will disclose that she is having them in the form of mayonnaise on sandwiches and salads, in eggnogs or other drinks, in cakes, icings, puddings, ice cream, and other prepared foods. The same will hold true for other foods, such as milk, nuts, grains, which enter largely into the preparation of foods. Excessive cravings for fish, spices, nuts, fruits, and vegetables are more apparent. Episodic indulgences may be as frequent a cause as out-and-out excesses; a food debauch, particularly in the latter months of pregnancy, may induce sensitization in the offspring. Fad diets may have the same tendency.

A widely varied diet is helpful in meeting the problem. If the nutritional requirements of the pregnant woman make it imperative for her to have larger than usual quantities of any foods, the obstetrician may prescribe them in part in "allergenically-denatured"† form. In the fish and nut groups, there appears to be a common group antigen, and heat does not reduce their allergenicity; reduction in the total quantity consumed is indicated, therefore, rather than variety.

The cardinal principles to be borne in mind in avoiding intrauterine food sensitization would be: (1) prescribe a widely varied diet; (2) give a portion of the food in "allergenically-denatured" form; (3) dis-

*There appears to be a misunderstanding in the minds of some physicians with relation to my viewpoint on congenital allergy, and I feel that I can do no better than to quote directly from one of my articles[4] on the subject.

"I do not claim that all cases of food allergy in infants are brought about through intrauterine sensitization, for Schloss and his co-workers have shown that young infants can become sensitized after birth by the passage of proteins through the intestinal wall. Further, I cannot say definitely that in all cases in which the mother indulges excessively in foods during pregnancy the child will be born sensitive, for all persons do not become sensitized even when they are exposed to proteins. I have found this to be true even among guinea pigs which are easily made sensitive.

"If this premise be correct, it is to be hoped that physicians in general, and obstetricians and pediatricians in particular, will make an effort to attempt to prevent the development of such cases of protein hypersensitiveness."

†The denaturation of proteins is a subject too complex and involved to discuss here. For our purposes, I should like to introduce the term "allergenically-denatured" food to describe one in which the protein elements have undergone a change which reduces allergenicity, or shock-producing properties. While proteins can be denatured by various methods, the type which has been studied in greatest detail, and in which we are most interested because of its practical application to protein foods, is that which occurs under the action of heat. It is influenced by temperature and time, among other factors, and can occur only in the presence of water.

courage overeating; (4) warn against excessive indulgence in any single protein food, and satisfaction of food cravings.

Investigations made on various forms of heat-treated milks,[5] malt and corn sugars,[6] and cereal grains and breadstuffs,[7] demonstrated that animals which had been rendered hypersensitive to certain specific food substances can tolerate, with little or no reaction, certain forms of heat-treated homologous products. The studies on milk showed that the lactalbumin and lactoglobulin fractions were reduced in antigenicity when heated (evaporated or boiled); the casein being entirely unaffected. Malt extracts on the other hand were not reduced in allergenicity, whereas dextrimaltose was reduced. With the grain foods, we found that not until the specific foods were tested could it be determined which form was "allergenically-denatured" and which was not; for example, certain commercially prepared dry cereals appear to be changed, whereas, certain home cooked cereals, breads, and crackers are not. From the work of Chick and Martin,[8] it is learned that egg white is reduced in antigenicity when heated and, from clinical experience, that hard boiled egg can be tolerated by the individual who is sensitive to the albumen fraction. The work of Schloss[9] suggests, however, that an individual who is sensitive to the ovomucoid cannot tolerate heated egg. The complexity of the change and the difficulty of interpretation is further illustrated by the work of Prausnitz and Küstner;[10] the latter was exquisitely sensitive to cooked fish but not to raw fish. In the absence of specific information pertaining to the diminished antigenicity of foods other than those which have been studied, no generalization can be made with reference to the influence of heat on all foods. It is our hope that this subject will be further pursued.

2. Sensitization in the Neonatal Period.—A newborn infant who receives one or several relief bottles of raw or dry milk during the first two weeks and is then put back on the breast entirely, may develop milk sensitization which is not evidenced until weaning is attempted. The interval between the first bottles and the beginning of weaning serves as the incubation period, as happens with the sensitization of the experimental animal. This preliminary contact with cow's milk permits sensitization to become established, and, during the periods of abstinence, the sensitizing antibodies which are produced, become fixed to the tissues. Subsequently, the ingestion of a small amount of that particular food may precipitate an allergic response. Sensitization may be prevented by prescribing some form of allergenically-denatured milk for the relief formula in conjunction with some denatured form of carbohydrate.

3. Sensitization Following Severe Gastrointestinal Disturbances.—Hutinel[11] and others observed that after severe gastrointestinal disturbances the child may manifest sensitivity to a food for which he

had complete tolerance prior to his illness. The explanation lies in the fact that the increased permeability of the intestinal wall engendered by the diarrhea permits the ready entrance of unchanged protein into the blood stream, as has been so admirably demonstrated by the work of Schloss[12] and his associates. It is important, therefore, during the treatment and convalescent care of severe intestinal disturbances, such as diarrhea, dysentery, and typhoid fever (a) to give "allergenically-denatured foods"; (b) to give a varied diet; and (c) to avoid new foods.

4. Sensitization in the Convalescent Period.—The increased permeability of the intestinal wall, characteristic of severe intestinal disturbances, also occurs during convalescence from other forms of disease, and following surgical operations, where loss of weight and wasting are evident. Foods that are not thoroughly cooked, for example, eggnogs, fruit whips, raw milk, are all potential sensitizing agents. From what has been pointed out, the wise course to follow is the same as that indicated in intestinal cases, rather than the generally prescribed diet which at present consists largely of raw and lightly cooked foods.

5. Sensitization Resulting From Excesses in Diet and Unusual Foods.—Experience shows that sensitization may occur to common foods that are taken in excess, milk, egg, and wheat being the chief offenders. Seasonal foods that are eaten at infrequent intervals and in great quantities, e.g., berries, shell food, nuts, seasonal fruits, and vegetables, are also potential sensitizers.

The practice of overfeeding infants and the present vogue of introducing many new foods early in infancy fall into this category.

Fad diets are usually composed of a limited number of foods and generally in a raw state. It is not far-fetched to assume that they may lead to food sensitization.

The danger of introducing an unusual substance to the gastrointestinal tract is best exemplified by citing the somewhat bizarre and extreme case reported by Stuart and Farnham[13] of a man who inadvertently ate some fish at a dinner and immediately developed a severe attack of asthma and giant urticaria. His story was that as a child he had drunk a can of glue on a bet and, as a result, had been unable to touch any fish thereafter. The prophylactic measures in all such instances are obvious.

B. THE PREVENTION OF DUST SENSITIVITY

Dust sensitivity, with the exception of congenital sensitization transmitted from a dust-allergen sensitive mother, is due chiefly to exposure to specific dust allergens. Early infancy and prolonged confinement to the sickroom are particularly vulnerable periods.

The actual prevention of sensitization to allergenic dusts must focus attention first on the nursery. It should be furnished very simply, without hangings, or heavy rugs. Everything in it should be washable so that cleaning can be accomplished without raising much dust. Articles such as down and feather pillows, comfortables, overstuffed furniture which produce much dust should be eliminated altogether or reduced to a minimum. A mattress and pillow stuffed with a good quality of hair is preferable, although good cotton linter and feather stuffed ones that are carefully covered with an impervious textile may be safe.

Heavy silk and woolen materials must be avoided, not only in the immediate environment but also as clothes. Furniture that gives off dust, even if it is located in other rooms, should be carefully covered with a down-proof material.

It may be instructive to cite examples of contact with dust allergens that were directly responsible for inhalant sensitivity. There is the striking instance of a child[14] who from early infancy slept on a mattress containing cattle hair. In early childhood, he had a hobbyhorse covered with cattle hair to which we traced his asthma. Elimination of both hobbyhorse and mattress relieved his symptoms.

Another child developed lobar pneumonia at two years of age. Several weeks later, he had his first attack of asthma. I discovered that he had been sensitized to the rabbit hair in pillows on which he slept in the home of his grandmother, with whom he lived as a young child and to which he returned to convalesce after the pneumonia. The father's occupation was responsible for subsequent attacks of asthma; he was employed in a hat factory, and we ascertained that rabbit fur is used in the manufacture of felt hats.[15]

An infant, whose bedroom window faced directly on a stable, became so profoundly sensitized to horse dander and as a consequence to a related protein in horse serum that anaphylactic shock resulted from a first small injection of horse serum.[16]

Just this summer, I met a young man whose case might almost be cited as a controlled experiment. He is one of three sons of the proprietor of an inn situated directly on the shore. At the age of 12 years, he became the proud possessor of a pony. The father presented each of the sons with one, on the promise that they would take care of them. For three months, this boy currycombed and groomed his pet. Then he went off to school, while his brothers stayed at home. When he returned, after a period of eight months, he discovered that every time he went to the stable, he had a most uncomfortable choking sensation. One day, a guest saw him in one of his "spells," and, for the first time, they were given actual standing—the child had asthma. He was found skin sensitive to horse dander. He has been clear of any difficulties for the past four years, since he has avoided contact with horses. There is no history of any allergic manifestations on either side of the family. And, interesting to note, the two brothers who have remained at home have had no difficulty.

Pollinosis may result from undue exposure to pollens. Piness and Miller[17] have cited the interesting case of a group of city dwellers who were transferred to a mountain community; a large number of these individuals developed hay fever, and family history seemed to

play a minor role. Other cases, less striking perhaps, can be found in the literature showing the relationship of undue exposure to pollens and the development of hay fever (Huber[18]). The seashore or other sections of the country that are relatively free from pollen may be more advisable for vacation purposes for the infant and young child.

It is not necessary to multiply examples; they would be mere reiteration of the fundamental principle demonstrated in our animal inhalation experiments.[19] Animals, exposed to a dust-laden atmosphere for a short period, were difficult to sensitize. As the length of the exposure was increased, a greater number of animals were sensitized. An instructive experiment was one in which we studied a female guinea pig and her four offspring. Three of the latter were exposed to an antigenic dust. After an interval of several weeks, the mother and the entire litter were brought into the specific dust environment. The three which had been previously exposed showed signs of experimental asthma, whereas the two that had no such previous contact remained unaffected.

Infants and children who sleep with pets or wooly toys and those who bury their heads in the bedding may be disposed to develop sensitization.

Insecticide sprays which contain pyrethrum should not be used since this ingredient appears to be a potent allergen closely related biologically to ragweed pollen.

C. THE PREVENTION OF DRUG SENSITIVITY

Although hypersensitiveness is primarily due to protein substances, it has been shown that substances other than protein can induce specific hypersensitivity. Drugs in themselves are not antigenic but function as a "hapten" (Landsteiner), and so change the character of proteins with which they combine as to produce new antigenic conjugates. The work of Landsteiner and his associate[20] shows that certain simple substances which cause human hypersensitiveness with skin manifestations, produce, upon injection into guinea pigs, both skin sensitivity and anaphylactic sensitization. This, Landsteiner believes, is due to some combination of the simple chemical compounds with some substance of the animal body. Certain drugs, therefore, that are characterized by their ability to form conjugates are capable of inducing sensitization.

There are striking instances of quinine idiosynerasy in patients who have been intensely treated and who remain profoundly sensitive for prolonged periods. The same is true for aspirin and many other drugs which are likely to be used in large doses, particularly in recurrent conditions. The phenolphthalein group of eathartics are notorious for their production of fixed drug eruptions. The pyramidon and allonal group have been assumed to be causative agents in the

development of agranulocytosis. Drugs such as sulfanilamide which have recently sprung into prominence should not be prescribed indiscriminately. Reports have already appeared in the literature which indicate that drug allergy can result from their use.

The indiscriminate use of external medicaments for the skin and mucous membranes at repeated intervals may in certain instances result in specific sensitivities.

Infants who react severely to a drug given for the first time may possibly have been sensitized *in utero;* caution should, therefore, be observed in the administration of drugs to pregnant women and nursing mothers.

D. PREVENTION OF "BACTERIAL ALLERGY"

With our present incomplete knowledge, it is difficult to give a well rounded picture of what is actually meant by "bacterial allergy" and how it can be successfully diagnosed and differentiated from the disease itself.

According to Zinsser,[21] it seems reasonably clear that in bacterial allergy we are dealing with the sensitization of the body by autolytically liberated antigenic substances which are absorbed from any focus in which bacteria react with inflammatory tissues, and, as a result of which, the body is subsequently rendered sensitive to contact with these same autolytic products, whether they are liberated and absorbed from a chronically existent focus or from an identical infection subsequently acquired.

From a clinical point of view, this train of occurrences, for which ample experimental evidence exists, must needs have far reaching consequences. It is true that the allergic phenomenon results from a mild, nonprogressive, and transitory irritation of sensitized tissue. It can, however, hardly be questioned that a body which is allergic to a given bacterial antigen is vulnerable to a degree that may lead to serious pathologic change such as inflammation, extensive edema, hemorrhagic transudation, and even necrosis. The reactions are, as a rule, explosive in nature.

The repeated common cold or coryza may well be attributed to an allergic basis. Zinsser,[21] in commenting on this phase, describes the simple experiment of taking a hot bath and then exposing oneself to cold air until an uncomfortable chilly feeling is experienced. Such a procedure usually results within twelve hours in the early signs of a severe cold which runs its ordinary course. According to this authority, this definite train of events excludes infection from without and can be explained only by one of two alternatives, either a direct invasion by bacteria previously present on a mucous membrane in which the capillary disturbances due to the chilling have permitted penetration, or by an allergic reaction of a sensitive mucous membrane to the bacterial antigens present in the nose when the com-

munication between tissues and surface is established by the capillary permeability resulting from the chilling. It is more than likely that human beings are all sensitive to one or more of the organisms present in their respiratory tracts and that the degree of this sensitiveness fluctuates according to the recently existing local flora. The noticeable similarity of the early stages of such reactions to the allergic conditions mentioned above, the speed of onset, and the almost bacteria-free condition of the early exudate in many cases favor an allergic mechanism.

After the allergic reaction has been thoroughly aroused, it is only natural that a secondary bacterial inflammatory process should supervene. It is for this reason that all infectious processes in early infancy and childhood should be meticulously treated. The prevention of recurrent episodes should materially reduce the severity of the infections. The proper hygienic and dietary measures and the judicious use of vaccines are all efficacious in the prevention of bacterial allergy.

That so destructive a disease as rheumatism may have for its underlying mechanism an allergy to some form of nonhemolyzing streptococcus is indicated by a great deal of experimental work which is ably summarized by Swift.[22] It is needless to say that the most important work to be done in rheumatism is preventive.

Certain phases of scarlet fever, tuberculosis, and pneumonia need only be mentioned here, for there is a great deal of work which is yet to be done in the allergy of these diseases.

It has been pointed out that certain diseases such as pertussis, pneumonia, measles, and scarlet fever often antedate the asthma. Whether any direct relationship exists between these diseases and the subsequent allergy is difficult to determine. It may, however, be largely related to an increase in membrane permeability permitting a more ready entrance of sensitizing substances. Therefore, all available methods of immunization against the infectious diseases should be employed.

E. THE PREVENTION OF HORSE SERUM HYPERSENSITIVITY

Horse serum hypersensitivity may result from one of three causes. First, we have shown experimentally[19] that an animal sensitized through the inhalation of horse dander may succumb to a primary injection of horse serum. Similarly, a child with horse dander sensitivity may die in anaphylaxis or have profound anaphylactic reactions when given a first injection of horse antiserum.[16]

Second, sensitivity to horse serum may result from hippophagy. This is less common in America than it is in Europe.

Third, sensitization to horse serum may result from repeated injections of antisera containing horse serum.

In order to prevent horse serum accidents, it is essential for every physician, before administering antiserum, to test the child. If the child gives a systemic reaction manifested by urticaria, or dyspnea, he should, as a rule, not receive serum. If serum is mandatory, it should be given slowly in small doses, subcutaneously; or by slow intravenous injection with a Woodyatt pump or Karelitz method, diluted with saline, concomitantly with adrenalin and atropine.

The actual prevention of serum sensitivity can be accomplished by diminishing excessive contact with horses, by desensitization of patients sensitive to horse dander, and by a reduction in the indiscriminate use of antisera in childhood pneumonia, meningitis, suspected diphtheria, and for superficial abrasions. Too often tetanus antitoxin is given without adequate provocation; unless there is definite cause for suspicion, it seems to me better to treat a superficial wound surgically rather than to resort immediately to tetanus antitoxin. Judgment must be exercised in each case, of course. My fear is that children, who have received antisera unwarrantedly, in later years may be conceivably in urgent need of serum therapy, and yet it may have become a menace because of sensitization established by the ill-advised previous serum therapy.

In the prophylaxis of diphtheria, the use of toxoid is to be preferred. Tetanus toxoid for immunization should be employed more extensively. In the past, before widespread immunization against diphtheria was established, many children received diphtheria antitoxin needlessly, and today the same may be said of tetanus.

It has been suggested that antitoxin derived from sheep, cattle, and rabbit serum be used instead of horse serum. These may have value as substitutes in the horse serum sensitive case; but, if used regularly in practice, an even larger number of individuals sensitive to lamb, beef, beef serum or milk, and rabbit proteins may be encountered than are sensitive to horse serum.

The prevention of serum sensitivity, therefore, rests heavily on the shoulders of the physician.

CONCLUSION

Constitutional differences in children make for a greater or lesser vulnerability to the development of allergy.

Whether a child is born of allergic parents or presents no evidence of allergy in his forebears, recent information makes it clear that allergy can develop in normal individuals if their tissues are more permeable for physiologic reasons or as a result of preceding pathology.

The allergens, whether food, pollen, animal, or vegetable dust, serum, bacteria, or drug, under certain circumstances, may invade the body of a normal or so-called potentially allergic child and result at times in a hyperergic state.

It is suggested that the antenatal period, infancy, and periods of disease and convalescence constitute vulnerable times when the individual must be protected from undue exposure to highly antigenic substances.

Measures are proposed which aim to prevent the inception of food, dust, drug, serum, and bacterial sensitivity, through the regulation of the diet, the management of the environment, the control of drug and serum therapy, and the reduction of recurrent invasions of pathogenic agents.

An application of the many factors now known to influence the incidence of allergy may result in a greater control or possible prevention of these conditions that are so prevalent in pediatrics practice.

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THE TREATMENT OF PARADOXICAL INCONTINENCE OF URINE ASSOCIATED WITH SPINA BIFIDA

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SPINA bifida is a common congenital anomaly, Sutherland[19] having observed fusion defects of the vertebral laminae in 5 per cent of roentgenograms of the spinal column. While the anomaly is not always associated with disturbances of the nervous system, Fuchs[6] in 1909 noticed a definite relationship between spina bifida and enuresis, an observation which Janeke[9] confirmed in 1916. He found some degree of spina bifida in thirty-three of sixty-three bed-wetters, and Peritz[16] and Saar found the same condition in 68 per cent of adults and 35 per cent of children with enuresis. These figures are probably too high where they concern children since the lumbar and sacral laminae usually fail to fuse until between the seventh and tenth years.

Nevertheless, because 70 per cent of the defects occur in the sacrum and 25 per cent in the first lumbar vertebra, an important relationship exists and the treatment of the disturbances of micturition which may accompany spina bifida constitutes a serious problem, both for the pediatrist and for the urologist. While this problem may often appear insoluble, many of the patients may be relieved by simple methods which are quite free from risk.

Spina bifida may exist without disorders of the nervous system; it may be associated with disturbances referable only to the bladder; or it may be accompanied by varying degrees of anesthesia and paralysis involving the pelvic girdle and lower extremities with or without involvement of the bladder and rectum.

In the first group the spina bifida is usually occult and without clinical significance; in the second and third there is usually meningocele or meningomyelocele, but any type of deformity may be unaccompanied by or associated with any type of disturbance of the nervous system.

In those cases in which the only dysfunction involves the bladder, there may be no changes in the spinal cord itself, or the cauda equina or spinal nerves may be compressed by abnormal tissue filling the gap in the spinal column. If these are lacking, it is necessary to assume that there is some associated congenital defect, as yet unidentified, in the peripheral nerves or plexuses of the bladder.

In the form with visceral and somatic disturbances, the spinal cord may present a variety of lesions such as hydromyelia in the sacral portion (von Frankl-Hochwart,[20] Oppenheim,[14] Fuchs[6]); fibrous bands extending through the bony defect from the dura to the skin (Scharnke,[18]

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Wodak[21]); fat pads or cartilage compressing the cord (Dalziel,[3] Delbet and Leri[4]); a cleft in the spinal cord (Sachs); or herniation of the cord or of the cauda equina into the bony defect (Buchstein and Love[1]). In some cases no gross lesion has been demonstrated other than the defect and a meningocele; Penfield and Cone[15] have suggested that the spina bifida somehow prevents normal ascent of the roots of the sacral nerves during development and that the resultant traction injures them.

The cause of the spina bifida itself remains unknown. Sachs has attributed it to hypersecretion of the choroid plexus in utero, an idea favored by the frequent association between spina bifida and hydrocephalus. Twenty-five per cent of patients with spina bifida present congenital anomalies of other organs.

DISTURBANCES OF THE BLADDER ASSOCIATED WITH SPINA BIFIDA

These may be divided into two groups: the first characterized by retention leading to paradoxical (overflow) incontinence and the second, by genuine incontinence. In the first group there is usually a history of difficult urination with nocturnal enuresis; diurnal incontinence is a later manifestation. The overflow is characteristically intermittent, and the patients usually void small amounts of urine between the periods of incontinence, while those with true incontinence dribble continuously, usually from birth.

Physical examination may disclose only the spina bifida; other congenital anomalies as well as somatic sensory and motor disturbances due to an associated lesion of the spinal cord may be found. If there is considerable residual urine, the bladder will be palpable. Pyuria is common; hydronephrosis and infection may damage renal function before the vesical disturbance becomes conspicuous and lead to anemia, the muddy complexion of nephritis, and to weight loss. These secondary changes appear late and are not found in the patient with true incontinence.

MECHANISM OF NORMAL MICTURITION

It is generally conceded that the pelvic nerves, arising from the upper sacral segments of the cord, supply motor fibers to the detrusor and carry the chief sensory fibers from the bladder.[8] The hypogastric or presacral plexus carries inhibitory fibers to the detrusor, and a few sensory fibers which convey the sensation of overdistention. The fibers of this plexus enter and leave the lumbar and lower thoracic cord. The pudendal nerves, from the sacral cord, are motor to the external sphincter and sensory to the prostatic urethra.

The chief sensory tracts of the bladder probably lie in the posterior columns, the motor in or about the pyramidal tracts.

Considerable uncertainty exists as to the nervous mechanism of the internal sphincter, most investigators holding that stimulation of the pelvic nerve relaxes the internal sphincter and stimulation of the hypo-

gastric plexus contracts the internal sphincter. All are agreed that stimulation of the pudic nerve tightens the external sphincter.

It seems more probable that the internal sphincter is not an independent, separately innervated muscle but is an integral part of the detrusor which is kept closed by its inherent tone. It is opened during micturition partly by contraction of the trigonal muscle (Young[22]), and partly by the pressure of the detrusor contracting upon the urine. The external sphincter is also forced open by the escaping urine (Rehfisch[17]) and comes into play as a voluntary mechanism only when the desire to micturate exists and is suppressed, i.e., the external sphincter is an emergency brake.

As the bladder fills with urine, it relaxes, probably without the intervention of the nervous system, until a tension of 10 to 14 centimeters of water is reached (Dubois), and produces "the desire to void."

Voluntary urination is probably then initiated in one of two ways, depending upon the tension within the bladder. If it is low and no desire to void exists, micturition may be brought on voluntarily by tightening the abdominal muscles, thus increasing the intravesical tension sufficiently to stimulate to strong contraction the detrusor and the trigone. The latter in turn forces and pulls open the internal sphincter. The external sphincter may be overcome by the intravesical pressure, or may be relaxed voluntarily.

If the desire to void is imperative, it is probably necessary only to relax the previously contracted external sphincter.

PATHOLOGIC MECHANISM

While Langworthy and Dees[10] believe that they can identify disturbances of the motor nerves by means of the cystometrogram in certain cases, it seems likely that the most important factor in the neurogenic dysfunction of spina bifida is loss of sensation in the bladder. As a result, micturition is infrequent because the desire to void is not felt until the development of a pressure higher than that normally required. Thus the intravesical tension is slightly but almost constantly elevated to an extent sufficient to cause capillary stasis and inadequate oxygenation of the detrusor, which then slowly atrophies with consequent loss of expulsive force. Urination is made increasingly difficult, finally becoming incomplete when contraction of the weakened detrusor ceases before the bladder is empty, and residual urine collects. The weight of the retained urine further impairs sensation by producing pressure anesthesia of the wall of the bladder. As a result, the intravesical tension may rise high enough to cause myogenic contractions which expel urine without producing a sensation, the stage of paradoxical or overflow incontinence. It is at this period that treatment is most often sought.

True incontinence is the result of a different train of circumstances, rather than of a later stage of the above process. It probably results

when sensation is so defective that, owing to absence of the reflex arc, normal tone never develops in the sphincters, and continuous dribbling from an empty bladder occurs.

DIAGNOSIS

The coexistence of a manifest spina bifida with urinary incontinence is the usual picture. Spina bifida, however, must be considered whenever a child or young adult complains of difficult urination or incontinence of any grade. Both manifest and occult spina bifida are usually evident on physical examination, although a roentgenogram may be required to demonstrate the latter. Neurologic examination often discloses anesthesia in the perineum and feet and motor weakness in the anal sphincter and lower extremities.

Cystourethroscopy reveals the usual signs of neurogenic dysfunction: relaxation of the internal sphincter, fine trabeculation, reduction of sensation, and diminution of expulsive force.

The presence of residual urine differentiates paradoxical from true incontinence. The writer has emphasized the importance in paradoxical incontinence of looking for mechanical obstruction at the vesical neck such as congenital valves of the prostatic urethra, hypertrophy of the verumontanum, and contracture of the prostate since the retention of neurogenic dysfunction may often be relieved completely by treatment of a mechanical obstruction. It is to be remembered that a detrusor which has been weakened by disease of the nervous system is readily blocked by an obstructive lesion so insignificant that it would not even produce symptoms if the detrusor were normal; moreover, this may occur at a stage when the detrusor, while weakened, may be perfectly able to expel urine if no obstruction exists.

TREATMENT OF THE RETENTION-OVERFLOW TYPE

When the neurogenic vesical dysfunction of spina bifida is accompanied by residual urine, two quite different forms of therapy must be considered, namely, operation upon the spina bifida, or attempts to substitute training for the defective sensation, supplemented by measures to increase the expulsive force of the bladder.

If a meningocele with or without myelocele is present, it should be explored, both to search for a source of pressure upon the spinal cord and because of the danger of perforation and infection. Mertz and Smith[13] collected from the literature seventy-nine cases in which this had been done; over half had been cured, and many more had been benefited. Such favorable results are probably due in part to the tendency to report the good ones. Gross and Sachs[7] reported a mortality of 27 per cent in 57 cases of spina bifida subjected to operation.

When, on the other hand, the spina bifida is of the occult type and the nervous system is intact except for the vesical innervation, or when operation upon the spine has not restored the function of the bladder, an

attempt to set up a substitute mechanism should be made. The first essential is an intelligent, cooperative patient with some sensation remaining in the bladder. He is taught to micturate at predetermined hours without waiting for the desire. Micturition is most effective in the sitting position; haste is incompatible with success, and at least five to ten minutes must be devoted to each urination, which should consist of a series of two or three sustained, forceful, straining movements, each lasting one to two minutes and separated by brief rest periods. Manual pressure over the bladder may be helpful. The interval between urinations at first should not be more than two hours during the day and three during the night in order to avoid completely any distention of the bladder.

Cholinergic drugs to increase the tone of the detrusor should be started at the beginning of the training period and continued until residual urine disappears or treatment is abandoned. Pilocarpine in 0.1 grain doses every six hours may be given to the average adult and the amount gradually increased until a mild reaction is produced; it should be continued in a dose just below that which causes a reaction. Myerson has recently observed that a combination of prostigmin and mecholyl has a powerful effect upon the detrusor and suggests an initial dose of 0.5 mg. of the former and 5 to 10 mg. of the latter. The writer has not yet had an opportunity to try this combination.

A few patients with slight retention will respond to this regime alone. Most will also require rest of the detrusor. With a small residual urine this may consist of emptying the bladder daily with a catheter. If this fails, an inlying catheter should be tried. It is removed once or twice weekly in order to determine whether "timed" micturition will now empty the bladder. If not, more complete and sustained rest of the detrusor and restoration of expulsive force may be secured by cystostomy with constant drainage which should be maintained for six to twelve weeks or more.

Either of these methods may, in addition to improving the expulsive force, improve sensation by removing that part of the hypesthesia which may have been due to pressure from the retained urine. In general, cystostomy is preferable to the inlying catheter for prolonged drainage both because it carries no danger of epididymitis nor of injury to the urethra, being more easily handled, and because it permits the use of a larger tube, thus insuring that the bladder will be continuously empty and at rest. The tube should be changed often enough to prevent plugging, and should drain constantly into a bottle. Clamping of the tube even for a short period defeats the purpose of the drainage.

Another measure which is said to increase the expulsive force of the bladder is sympathetic denervation or presacral neurectomy as advocated by Learmonth and Braasch. Its value has yet to be proved conclusively. Its use is based upon the idea that, since stimulation of the vesical sym-

pathetics causes relaxation of the detrusor, section of them must abolish inhibitory impulses to it, thus improving its tone and contractility. McCrea and McDonald[12] have noted a great divergence in the results of experimental stimulation and section of this nerve; clear-cut clinical evidence of the value of presacral neurectomy in the incomplete emptying of neurogenic dysfunction is not yet available, only a small number of cases having been reported in sufficient detail to permit critical analysis.

Whether presacral neurectomy is theoretically defensible depends upon a question which cannot be settled at present, namely, granted that inhibitory impulses do travel down the plexus to the detrusor, is their flow constant or intermittent? If it is constant, the operation should be effective; if it is intermittent (when the bladder is full and urination is postponed), neurectomy will be futile. One must consider also the possibility that, even if expulsive force can be increased by sectioning the nerves, a new inhibitory mechanism may develop in the vesical plexus or in the detrusor itself, in time nullifying any good effect from the procedure.

CASE REPORTS

CASE 1.—C. R., No. 650726, aged 17 years, following surgical repair of a sacral meningomyelocele at the age of 3 months, had always had difficult urination with occasional incontinence. He was first seen on June 12, 1936, during an attack of acute pyelonephritis, when he had extensive atrophy and almost complete paralysis of the lower extremities, 200 c.c. of cloudy, infected residual urine, and bilateral infected hydronephroses. Urinary antiseptics and an inlying catheter were used for a week, after which the latter was replaced by intermittent catheterization and interrupted voluntary urination at two-hour intervals. The incontinence, residual urine, and pus disappeared in the course of about two weeks. The improvement has persisted to date because of the intelligent cooperation of the patient, except for a short period when he ran away from home and abandoned his regime. All the old symptoms recurred, but disappeared after the use of an inlying catheter for two days followed by resumption of the regime. Pyuria recurs with each attack of coryza, but it is easily controlled by ammonium mandelate and does not interfere with emptying of the bladder.

CASE 2.—G. K., No. 613822, aged 15 years, had always had difficult urination with nocturnal enuresis until two years before admission, when diurnal incontinence appeared.

He was undernourished, had a palpable defect in the sacrum, and a visibly distended bladder. Neurologic examination was negative. The hemoglobin was 55 per cent, and there were 200 c.c. of residual urine containing many pus cells and *Escherichia coli*. X-ray pictures revealed spina bifida occulta of the entire sacrum, and bilateral hydronephrosis and hydroureter grade two.

At cystoscopy the bladder was large, atonic, and trabeculated with multiple cellules, seriously reduced in sensation and expulsive force, and the internal sphincter was relaxed.

Administration of the ketogenic diet and cholinergic drugs and the use of an inlying catheter for six weeks neither reduced the residual urine nor relieved the incontinence which appeared after removal of the catheter as soon as 200 c.c. of urine accumulated in the bladder.

Presacral neurectomy was performed on March 16, 1933. Because of the flaccidity and insensibility of the bladder, a cystostomy was done at the same time to put it at rest. Recovery was delayed by a hematoma in the wound, but on April 16 the cystostomy had closed, and the residual urine was 20 c.c. The patient was taught to void every three hours during the day and once at night. Four months later, there was no residual urine, and control was normal.

In June, 1937, incontinence had recurred, and 300 c.c. of cloudy residual urine were present. Inquiry disclosed that he had abandoned his regime and was voiding only when overflow or the desire appeared. The regime was reestablished, with the addition of two-stage urination, and calcium mandelate (Abbott) was given. Three days later there were 50 c.c. of clear residual urine, and incontinence had disappeared; he returned home against advice. A follow-up letter in January, 1938, disclosed that he was following the regime, incontinence had not returned, but the urine was cloudy.

Comment.—The patient is on the borderline as regards cooperation, in that he loses his enthusiasm after a time, abandons his regime, and suffers a prompt recurrence of symptoms. If he then receives sufficient stimulation from the physician, he resumes his efforts and symptoms disappear. Evidently the presacral neurectomy was important in establishing his ability to empty the bladder, since catheter drainage, urination by the clock, and the use of cholinergic drugs failed to do so before the nerves were divided. His subsequent experiences seem to establish the fact that the operation alone will not cure the retention of neurogenic dysfunction.

CASE 3.—H. S., No. 630642, aged 5 years, had had a sacral meningomyelocele removed at the age of 3 days and had never learned to control the bladder. He had anesthesia of the perineum, a scar over a defect in the sacrum, a palpably distended bladder, and 200 c.c. of hazy residual urine containing pus and *Escherichia coli.* Excretory urograms showed normal renal pelves and ureters and, incidentally, a sacral spina bifida. The cystoscopic findings were identical with those in Case 2.

Presacral neurectomy and cystostomy were performed on Sept. 10, 1934. Six weeks later, the cystostomy was allowed to close, and the patient was observed for fourteen days in the hospital. On urination by the clock he had 5 to 10 c.c. of residual urine and was dry at all times.

Nevertheless, in April, 1935, he was again incontinent but without residual urine. Antispasmodic drugs and encouragement yielding nothing, it was decided that the incontinence was due in part to a lax sphincter and in part to lack of cooperation, i.e., it was easier for the patient to be wet than to be dry. Therefore, on June 18 the membranous urethra was lightly compressed by a strip of fascia lata stitched to the rectus sheath, and carried through a subcutaneous tunnel alongside the scrotum to the posterior surface of the membranous urethra and out on the other side to the rectus sheath, the idea being to make continence easier than incontinence.

Nine weeks later, after an interval at home, the patient had neither residual urine nor incontinence, although he was not following any regime. However, a follow-up letter in January, 1938 disclosed that he was again suffering from slight incontinence, although he voids eight or nine times in twenty-four hours in addition. (He was totally incontinent before treatment was begun.)

Comment.—This case illustrates clearly the various steps which may be required to relieve incontinence, as well as the importance of cooperation. A complication may develop in young children which does not occur in older people: the child may utilize his difficulty to secure special attention from his parents, a factor probably present in this case, and strikingly illustrated by one in which presacral neurectomy was not done.

CASE 4.—The following patient is included despite the absence of spina bifida because the anomaly of the sacrum was congenital and was associated with the same disturbances of vesical function and of the lower extremities that usually accompany spina bifida.

J. H., No. 641317, aged 14 years, was born with a deformed sacrum, clubbed feet, and partial paralysis of the muscles of the legs. The deformities and paralyses of the extremities had been corrected early in life, but up to July, 1935, she had always been incontinent of urine. A bizarre distortion of the sacrum was noted both on clinical and x-ray examination, but no spina bifida was found. The perineum was hypesthetic. The muscles of the lower extremities were poorly developed, but the patient walked well. Cystoscopy disclosed the usual changes, with rather pronounced loss of sensation and expulsive force.

A two weeks' trial of pilocarpine, mecholyl, twice daily catheterization, and two-hourly urination having failed, presacral neurectomy and cystostomy were performed on Aug. 16, 1935.

Four months later the fistula was allowed to close, but urination was slow and difficult, and there was 150 c.c. of residual urine. With daily catheterization and the use of mecholyl and pilocarpine, this was reduced to 75 c.c., and urination was easier. At home she was catheterized daily; later occasionally pilocarpine was administered, and the regime rigidly followed. There was slow but progressive improvement, and on Dec. 27, 1937, her mother reported that catheterization and pilocarpine had not been employed in many months because the girl soiled herself only on those infrequent occasions when she forgot to follow her routine and that the residual urine, checked at my request, was 30 c.c.

Comment.—The good result here obviously depended as much (and perhaps more) upon the persistent aftercare and excellent cooperation of the patient and her mother who converted what at first seemed to be a failure into a success. Nevertheless, the operation made a distinct contribution, since drugs, catheterization, and training failed until the plexus was excised.

In all probability the postoperative difficulties came in part from too brief a period of drainage, and in part from the fact that the patient had to learn how to urinate for the first time in her life after the operation.

It ought to be emphasized again that an intelligent patient with the desire to cooperate and some sensation in the bladder is essential for success. During the period covered by this report two patients were refused treatment, the first because he was deficient mentally and the second because the bladder was entirely without sensation. A third patient had such severe renal insufficiency from hydronephrosis and pyelonephritis that a permanent cystostomy was made.

DISCUSSION

While the group of cases reported is small, the results give such unmistakable evidence of the soundness of the theory which underlies the treatment and which is little known that it seems desirable to report them. The writer does not wish to give the impression that normal micturition has been restored, because that is not true. The patient has in each instance been taught to empty the bladder by a rather laborious substitute mechanism designed to compensate for the lost sensation and, in part at least, for the lost expulsive force. This substitute mechanism is the basis for all treatment and should be mastered by the patient before operative therapy is employed. He must understand, too, that its employment must be lifelong, although it will become somewhat easier with practice. Essential features are deliberation, repeated efforts interrupted by rest periods, and the use of urination "by the clock" using an alarm clock at night until a genuine habit has been established.

The data in this paper unfortunately cannot be used to estimate the value of presacral neurectomy, since rest of the bladder, has always been used to supplement it. Thus the effects of the two cannot be clearly separated. It should be noted, however, that rest of the detrusor and the use of cholinergic drugs under observation in the hospital preceded operation by six weeks in Case 1 without yielding any benefit, so that it may be said that presacral neurectomy did produce tangible improvement.

The fundamental importance of earnest cooperation by the patient is illustrated by a patient who, while he did not have spina bifida, did have a disturbance of the bladder exactly similar to that often seen in this condition.

D. K., No. 631352, aged 2 years, developed perineal anesthesia, retention of urine and fecal incontinence immediately after the intraspinal injection at home of antimeningococcic serum for meningococcic meningitis. He was first seen in December, 1934, six months after the injection. During the interval his mother had catheterized him. The findings were those of injury to the cauda equina. Training, cholinergic drugs, and an inlying catheter proving useless, a cystostomy was done with the thought that drainage and training ought to be effective without presacral neurectomy. Six weeks later, the fistula was allowed to close, pilocarpine was given, and two-hour urination was instituted. The residual urine ranged from 0 to 60 c.c., and the patient remained dry.

Incontinence returned at once when the patient was discharged from the hospital. He was brought back, admonished, and placed on two-hour urination regime without other measures. The residual urine disappeared along with the incontinence and did not return during the two weeks' observation; recurrence again followed dismissal. It seems evident that the difficulty here is a lack of discipline at home, where the patient uses his disability to secure the sympathy and privileges which he could not secure in the hospital.

While four cases form an insecure basis for concluding that the methods outlined are adequate, they have been used successfully (in the sense of restoring emptying of the bladder and relieving incontinence of urine) in six patients with the retention-overflow type of sensory vesical dysfunction due to other causes (old transverse myelitis in two, injury of the cauda equina in two, and tabes dorsalis and multiple sclerosis each in one). The conclusions therefore seem to rest upon a sound basis.

The methods advocated are neither new nor original with the author, but seem to be little known and little used. Since their use under proper circumstances will contribute substantially to the comfort and longevity of sufferers from the retention-overflow type of incontinence, they ought to be more widely employed.

While relief has been complete only in Cases 1 and 4 and in Case 2 only when the patient wishes to cooperate, it should be remembered that the residual urine has been abolished in all. Thereby a definite hazard to longevity has been removed in every case: that of gradual destruction of the kidneys by stasis and infection.

True incontinence accompanies spina bifida much less frequently and requires a separate discussion which is beyond the scope of this paper.

SUMMARY AND CONCLUSION

Spina bifida may be accompanied by paradoxical incontinence of urine due to an associated lesion of the spinal cord, pelvic nerves, or vesical plexus.

The factor which disturbs the function of the bladder is diminution of its sensation leading at first to loss of expulsive force with residual urine, and later to the incontinence of overflow.

Incontinence and residual urine may often be eliminated by training supplemented by measures to increase the expulsive force of the bladder without attempting to attack the underlying lesion in the nervous system.

These methods, none of them new, have relieved incontinence and residual urine in four patients with spina bifida who were regarded as suitable and in five patients with retention-overflow due to other causes.

The first essential for success is an intelligent, cooperative patient with some sensation in his bladder. Three patients who lacked these essentials were seen but not treated by the measures outlined.

While incontinence and residual urine are relieved, it is accomplished by compensating for the loss of sensation by voluntary effort which must be continued throughout life to prevent recurrence. Subjectively normal urination does not return.

Cystostomy and presacral neurectomy have been useful in restoring lost expulsive force.

The methods discussed are not helpful in true incontinence.

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ENURESIS IN CHILDREN

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DURING the 125 years since enuresis has been dignified by the attention of clinicians, opinions regarding its nature have undergone a cycle of changes. Trousseau,[1] who was among the first to interest himself in this condition, believed that enuresis is due to an organic defect in the innervation of the bladder resulting in a spasm of the detrusor muscle which opens the internal sphincter; and Henoch[2] concurred in this view.

Heubner[3] also attributed enuresis to an organic defect. He looked upon bed-wetting as a continuation of the state in infants, when the innervation necessary for voluntary control of micturition is undeveloped. Since enuretics can frequently control micturition during the day, the developmental defect in bladder control is only partial.

Holt[4] believed that enuresis is, in most instances, "purely a habit, often associated with other habits which indicate an unstable or highly susceptible nervous system," and he advocated intensive training procedures. Holt's attitude represents a departure from the organic viewpoint, and his thesis has been widely accepted by pediatrists.

Within recent years much emphasis has been laid on psychologic factors in the pathogenesis of enuresis, and pediatrists are inclining more and more to this viewpoint. It is our opinion that, in the large majority of children with true enuresis, the basis is organic and resides in an anomalous innervation of the bladder (irritable bladder) and that faulty training and psychologic factors are important contributory influences.

By enuresis is meant the repeated, involuntary discharge of urine after the second year of life. It is a frequent symptom in childhood and may be associated with a great many conditions of widely different origins. Of 1,000 children between the ages of 4 and 12 years, inclusive, in the Out-Patient Department, Bellevue Hospital, 26 per cent gave a a history of enuresis. This includes children in whom the basis was grossly organic, but these constitute only a small proportion of the cases. Enuresis is one of the items included in the form sheet used for taking histories in the outpatient department at Bellevue Hospital, and therefore this symptom is regularly noted even when the parent might otherwise neglect to mention it.

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The high incidence in the Bellevue Hospital series is certainly not representative of the general population and is due to special sociologic and psychologic conditions. The figures, nevertheless, give some measure of the frequency of this condition and indicate that it is one of the most common disorders of childhood. At the Harriet Lane Home Dispensary[5] enuresis was the chief complaint in one out of every fifty-six children. In many instances the symptom is taken for granted by the parents and is not mentioned unless special inquiry is made.

Enuresis is to be distinguished from the urinary incontinence due to gross organic lesions. Involuntary micturition may be associated with local conditions in the genitourinary tract, such as cystitis or vesical calculus. Under these circumstances there is marked frequency and urgency, and leucocytes or red blood cells or both are found in the urine. The etiological significance of conditions like balanitis, phimosis, and adherent prepuce is doubtful, and cures following the correction of such difficulties are probably due to a psychic rather than a physical effect.

Urinary incontinence may be due to disease in the innervation of the bladder, e.g., hematomyelia, transverse myelitis, spina bifida, or cord tumor. The association between spina bifida, bladder disturbances, and clubfoot has long been known. Enuresis may be part of a general disorder such as diabetes mellitus, epilepsy, or diabetes insipidus.

In older studies on patients with enuresis[6] trabeculated bladder, residual urine, and anomalies in vesical configuration were reported in a considerable proportion of cases. In a urologic study of 330 cases of enuresis resistant to ordinary methods of treatment, Campbell[7] found that about two-thirds showed abnormalities in the urogenital tract which he believed to be causally related to the enuresis. The most common lesion in girls was a urethrotrigonitis, the most common lesion in boys congenital obstructions along the urethra usually at the meatus. Next in frequency in boys was a prostatitis and verumontanitis. In addition a wide variety of other lesions were found.

SYMPTOMATOLOGY

The bed may be wet once or several times during the night, and micturition before going to bed seems to have no influence on the symptom. The child usually does not awaken even after the urine is passed. Older observers refer to the force with which the urine is expelled, but this is by no means constant. In some children there is urinary dribbling. The volume of urine in enuretics is unchanged. Friedell[8] made the interesting observation that in a considerable proportion of children with enuresis the concentration of urine is lower during the night than during the day, a reversal of the condition in normal individuals.

Frequency and urgency occur in the majority of patients. Pain in the lower abdomen or perineum is a not uncommon complaint in chil-

dren with urgency who are forced to hold their urine. Diurnal enuresis frequently accompanies nocturnal enuresis. It may occur during the child's nap but often takes place while the child is awake. It was noted in 40 per cent of the cases at Bellevue Hospital, and other observers have noted a similarly high proportion of day wetting among enuretics.

Diurnal enuresis without bed-wetting is unusual. In boys it is ordinarily due to unwillingness to take time off from play to empty the bladder. The child may wet because he is ashamed to ask permission to leave the classroom. It occasionally occurs with laughter or fright.

Enuresis nocturna, i.e., involuntary bed-wetting, is to be distinguished from voluntary bed-wetting, or factitious enuresis. This is usually psychogenic in origin, the child wetting out of spite or to attract attention. Factitious enuresis may also occur if the child is too lazy to leave the bed or is afraid of the dark, if the bedroom is too cold, if the toilet is inaccessible, or in a neglected household where habits of cleanliness are poorly developed.

Although enuresis occurs frequently in all social economic groups, it is more common in clinic than in private patients. This is due to inadequate training procedures among clinic patients, lower standards of cleanliness, inaccessible toilets, crowded quarters making it necessary for several children to sleep in one bed, and exposure to cold and dampness. It is of interest in this connection that enuresis was a frequent complaint among soldiers in all the armies during the World War but was practically nonexistent among officers.

In the Bellevue Hospital series the percentage incidence of enuresis remained unchanged from the fourth through the twelfth year. The condition is said to be more common in males than in females, although the opposite has also been reported. No sex difference was noted in the Bellevue Hospital series.

According to Davison,[5] enuresis is much more common among white than among negro children. He feels that this is not because of disregard of the symptom in the negro families since, among the poorer classes in Baltimore, colored children are usually better cared for than white children. He attributes the difference to the greater frequency of neurotic and neuropathic conditions among whites. Anderson[9] found no racial difference in the incidence of enuresis.

Depth of sleep has no relation to the etiology of enuresis.

Enuresis is not infrequently observed in children, previously continent, following a severe illness. In these patients the symptom may be based on the child's desire to retain the special attention of the parents and attendants which he had had during the illness. Usually a careful history will elicit the fact that the child has had urinary symptoms such as frequency, urgency, and occasional wetting prior to the illness, indicating that the psychologic is not the only factor.

The drinking of large amounts of water before bedtime may lead to bed-wetting. Water drinking is considered a great sport by many children, and water drinking contests are not infrequently engaged in with zest. This may be developed to such a degree as to lead to a diagnosis of diabetes insipidus.

Urinary acidity plays no part in the etiology of enuresis.

Spina bifida occulta, as indicated by defects in the lumbar and sacral vertebrae, is no more common in children with enuresis than in those without it.

Heredity.—It is frequently possible to obtain a history of enuresis in a sibling or in the parents. Frequency, urgency, and nocturia are common complaints among the parents of enuretics.

Mental Deficiency.—There is no relation between enuresis and moderate degrees of mental deficiency. Children who are moderately retarded are readily trainable at about the same age as normal children. Addis[10] found no striking difference in the intelligence quotient between enuretic and nonenuretic children. Enuresis is common in low-grade, mentally defective children who are incapable of learning vesical control.

Institutional Enuresis.—Enuresis occurs frequently in institutions for the care of children. It is not clear whether this constitutes a special etiological group. According to A. F. Payne, about 10 per cent of the children at the Hebrew Orphan Asylum, New York, are bed-wetters. Payne has used many methods of treatment without success. The giving of rewards, an appeal to a sense of decency and cleanliness, isolation, and restriction of privileges were unsuccessful. Awakening the children during the night made them irritable and nervous. The most effective method used was a thorough explanation of the situation to the entire group, i.e., all the children in the home, in a kindly, sympathetic way.

Fecal incontinence is occasionally observed in children with enuresis. It is much more common in boys than in girls. Unlike enuresis it occurs more frequently during the day than during the night and is ordinarily an acquired condition. It is usually accompanied by enuresis but it may be an isolated symptom.

Fecal incontinence may be due to gross disturbance in the innervation of the rectum, but this is rare. The condition is seen most commonly in boys who are too preoccupied with play to take time for proper evacuation of the bowels. In some instances there is moderate stool frequency and the stools may be soft, although fecal incontinence may occur with normal stools. Faulty training may be a factor, particularly in young children where difficulties in vesical training are present. This symptom may be used as an attention-getting or spite mechanism, usually in young children following the birth of a second child.

Fecal incontinence is ordinarily more readily amenable to treatment than enuresis. In boys who soil because of carelessness, adequate time

for defecation in the morning and frank discussion of the social implications of the symptom are usually sufficient to cure the condition although occasional relapses often occur. If the stools are soft and passed several times a day, the elimination of irritating foods from the diet may be of value. An attempt should be made to correct psychologic maladjustments. In young children who soil following the birth of a second child, the patient should not be present when the diapers are changed, and discussion about diapers should be interdicted in the patient's presence.

Children with enuresis often present personality difficulties, but it is not clear whether these are more frequent than in nonenuretic children. The bed-wetter may develop feelings of inferiority and a sense of guilt if he is shamed because of his habit. There may be sleeplessness because of fear of wetting the bed, with resulting hyperirritability and easy fatigability.

Bed-wetting usually disappears spontaneously after the twelfth to fourteenth year although it occasionally persists into adult life.

PATHOGENESIS

Three major mechanisms[11] should be considered in the analysis of patients with enuresis: the "irritable bladder," the character of the training for vesical control, and the psychologic interrelationships between the child and his environment. Though enuresis may take place when only one of the mechanisms is operative, frequently two or all three are of etiological significance in the same patient.

Irritable Bladder.—The term "irritable bladder" is used to denote a condition in which abnormal urgency and frequency of urination (pollakiuria) are present. The condition, first described in 1865 by Trousseau,[1] is present in the large majority of persistent bed-wetters. In this group of cases enuresis is ordinarily continuous from infancy, differing in this respect from the enuresis on a purely psychogenic basis in which bladder training is established in the normal way and wetting occurs only after a free interval of several years. The potential bed-wetter may be suspected during infancy when repeated attacks of ammoniacal dermatitis (diaper rash) occur. In such infants urinary frequency is often present during the attack of ammoniacal dermatitis and persists after the condition has been alleviated. Inquiry will often reveal that urinary frequency, urgency, or bed-wetting is present in a parent or in the siblings.

Enuresis in the pollakiuric individual is ordinarily persistent, occurring regularly night after night and year after year in contrast to psychogenic enuresis when wetting is irregular with longer or shorter free periods. Day wetting usually accompanies night wetting.

It is important to remember that frequency and urgency may be present without enuresis, and involuntary micturition may occur only during periods of nervous tension, cold weather, or when a toilet is

inaccessible. Indeed, irritable bladder occurs in well-trained, intelligent children more often without than with enuresis. Such children are difficult to train and are often 3 or 4 years old before complete urinary control is established. Because of the difficulty in training, psychologic conflict around the urinary function is much more frequent than in normal children. Whether or not it is accompanied by enuresis, pollakiuria has the same significance and is susceptible to the same treatment, namely, belladonna.

The irritable bladder persists into adult life. Though the enuresis usually disappears at or before puberty, urgency and frequency remain, and in severe cases there may be nocturia. Adults who have been persistent bed-wetters during childhood develop urgency more readily than normal individuals when exposed to cold or to nervous tension.

This condition is familial. Usually one of the parents has urinary symptoms such as those described above, which have been present since childhood, and one or more siblings may be affected. Adults are often hesitant to admit that they have been bed-wetters during childhood, but a history of frequency and urgency is readily obtainable.

A psychic factor of greater or lesser importance ordinarily contributes to the clinical picture, as it does to the urinary function in normal individuals. The agitation and concern of the child lest involuntary micturition occur serve to aggravate the condition, and nervous tension of any sort will exaggerate the difficulty. Furthermore, the child may use the bed-wetting as an outlet for a spite or as an attention-getting mechanism.

The presence of urinary symptoms, persisting from infancy throughout life, occurring in several members of the same family and in several generations, strongly suggests that this condition has an anatomic basis, presumably in the innervation of the bladder.

The Physiology of Micturition.[12]—Newer observations on the physiology of micturition throw some light on the mechanism underlying the irritable bladder. It has been shown that, during the filling of the bladder, intravesical pressure remains practically unchanged until a threshold is reached at which level the pressure rises rapidly and active vesical contractions take place. Only then does the desire to micturate occur. At this critical pressure mild, rhythmic contractions of the detrusor muscle (which opens the internal sphincter) appear. The threshold may be lowered by a number of stimuli such as sounds, odors, temperature changes, coughing, laughing, straining, and by standing erect. With increase of bladder volume, a sensation of distention intrudes upon consciousness. The internal sphincter contracts and relaxes in reciprocal relationship with the detrusor muscle. It is entirely involuntary, and its reaction to voluntary control is secondary to the behavior of the detrusor. It remains closed during intervals of slight or absent vesical contraction. The external sphincter which is under voluntary control also remains closed and opens only after opening of the internal sphincter. When micturition is completed it closes before the internal sphincter.

Voluntary control of micturition is effected solely by voluntary or subconscious inhibition of the mechanism of spontaneous reaction to distention.

The bladder is innervated by three sets of nerves.[13] The pudic nerve is voluntary and arises from the first three or four sacral segments. It carries sensory fibers from the urethra and is the motor nerve to the external sphincter. The pelvic nerve, part of the parasympathetic nervous system, is also derived from the first three or four sacral segments of the spinal cord. It conveys most of the sensory impulses from the wall of the bladder and carries motor impulses to the detrusor, which opens the internal sphincter. The hypogastric nerve, part of the sympathetic system, transmits vesical sensation. Its motor functions are many: inhibition of the detrusor muscle; contraction of the ureteral meatus, trigon, internal sphincter, and smooth muscle of the prostate and seminal vesicles; transmission of vasomotor impulses to the bladder. Some investigators have also observed contraction of the detrusor muscle on hypogastric stimulation.

It would appear that in individuals with irritable bladder the threshold at which active vesical contractions take place is at a lower level than normal and that voluntary or subconscious inhibition of the spontaneous reaction to distention is incompletely developed. The favorable effect of belladonna is dependent on inhibition of the detrusor muscle which is innervated by the parasympathetic nervous system.

Amberg and Grob[14] studied the influence of atropine on the bladder function of children with enuresis. They found that in 9 out of 19 children a definite effect was produced. The pressure in the bladder was reduced even when the bladder contained larger amounts of fluid than before the administration of atropine, and the amplitude and the frequency of contractions were reduced. The bladder could hold more fluid without its escaping around the sides of the catheter, and, when discomfort was experienced, it was slight.

Faulty training[15] is an important contributing factor in the etiology of enuresis, particularly when there is irritable bladder. Delayed training may lead to enuresis when the maturing child's warnings of a full bladder are disregarded. If the optimal time to teach voluntary control of micturition is not utilized, training becomes increasingly difficult; this is particularly the case when other habits of cleanliness are neglected. As the child grows older, the habit of automatic urination in response to desire and without regard to circumstances becomes fixed, and training must therefore be directed against breaking up an undesirable habit as well as introducing a desirable one. Furthermore, with maturation, the child reaches a stage of independence and negativism where training is resisted and resented.

Parents who were themselves enuretic in childhood are likely to be more lax about training than other parents. They seem to be more tolerant toward the symptom, probably because they wish to protect the child against the suffering which they endured from critical parents and siblings during their childhood. Occasionally such parents are overzealous in their training procedures and oversolicitous regarding the procedure in an attempt to avoid enuresis later on.

Inadequate training is occasionally seen when the mother, in her desire to keep the child dependent on her, interferes with psychologic maturation by not permitting the child an adequate outlet for his budding sense of self-dependence. She continues to wash, comb, and dress the child at an age when children should be taught to do these things for themselves. Except for these rare instances, enuresis is uncommon in overprotected children.

Too early training, i.e., before the last trimester of the first year, often leads to an undesirable strain between parent and child around the urinary function. Training for micturition should be begun toward the end of the first year or during the early months of the second year of life when the child begins to indicate a desire to urinate by gestures such as pulling at the diaper, by general discomfort, or by whimpering. Children, trained during the early months of the first year, usually relapse and must be retaught later on. This process is often difficult and may lead to overemphasis on a function which should be a matter of routine. Relapses are also seen when training is interrupted by the occurrence of an infection.

A number of difficulties may arise as a result of the child's difficult trainability. The mother's censorious attitude may give the child a sense of inadequacy and, at the same time, arouse his negativism and make him resistant, so that wetting out of spite occurs. Fear of failure may become an obsession with the child and lead to a state of nervous tension, thereby making a situation which is already bad a great deal worse.

Psychogenic Enuresis.—Though psychic factors, other than improper training, influence to some degree the severity of the condition in most children with enuresis, they are probably of primary influence in only a few. Unlike most behavior disorders, enuresis is to a large extent a social disease, occurring much more frequently in clinic than in private practice. Unusual as a behavior disorder, also, is its occurrence during sleep. Although night terrors and sleep-walking also take place during sleep, they are ordinarily occasional manifestations, unlike enuresis which usually occurs regularly night after night and year after year. It is of interest that, whereas Jewish children are frequent patients in child guidance clinics, they are rarely enuretic, presumably because of the intensive care which they receive. Psychic factors, however, play an important secondary role in the pathogenesis of enuresis.

Of the behavior patterns which may give rise to this symptom, one of the most common is that in which the child wets the bed as an attention-getting or spite mechanism, the symptom being directed against a neglectful or overauthoritative parent. Enuresis may also be precipitated in first-born children by the birth of a sibling. In such instances there is jealousy of the new arrival, vengeful feelings against

the parents, a desire for attention, and an attempt on the part of the child to identify himself with the new baby. Under these circumstances children may soil as well as wet, may prefer to wear diapers, may wet both day and night and often while they are awake. They frequently show great interest in the diapers of the infant. An undue emotional attachment to the mother may lead the child to wet the bed in order to retain as long as possible the infantile dependence on an affectionate mother.

When enuresis is based primarily on a spite or attention-getting mechanism, the clinical picture differs from that in the children with irritable bladder. Urinary control is established in the normal way during the second year of life, and the child remains dry for several years. Usually between the fourth and the eighth years, occasionally earlier or later, the child starts to wet. Wetting usually occurs only during the night, is unaccompanied by frequency, urgency, or day wetting ordinarily, and is irregular. The child may wet for several weeks, then stop completely for a time and start again. It is important to remember that in psychogenic enuresis, children may wet the bed or their clothes intentionally (factitious enuresis).

MANAGEMENT AND TREATMENT

The treatment of a patient with enuresis requires an understanding of the factors underlying the condition, and a comprehension of the influence of the symptoms on the personality of the child. The therapeutic methods employed may represent a greater psychic trauma for the child than the condition itself, and this fact should always be kept in mind when a line of treatment is being formulated.

Before undertaking treatment, a careful history should be taken in order to permit evaluation of the relative importance of irritable bladder, faulty training, and psychologic factors. The urine should always be examined at the outset of treatment. In patients who do not respond to therapy, the examinations should be repeated several times, particularly for the presence of white blood cells. Factitious enuresis, (voluntary wetting) should be differentiated from true enuresis.

Psychologic Management.—The parents should be urged to assume an unemotional attitude toward the symptom. Great concern or severe censure often serve to aggravate the situation. Severe censure or shaming may agitate the child unduly and make him fearful and apprehensive, and this may color his personality permanently. The condition is not discussed in the child's presence, and no attention is paid to, nor agitation shown concerning, urinary mishaps. The condition is taken as a matter of course, and the child is encouraged and reassured when improvement begins.

When enuresis is based primarily on psychologic difficulties, the mechanisms involved should be studied and proper treatment instituted. In these patients the enuresis itself often requires little attention, and, with correction of the factors involved in the behavior difficulty, the enuresis promptly disappears. Cases of this type are occasionally seen, however, where all therapeutic devices are of no avail. Belladonna is of no value unless there is irritable bladder.

Suggestion.—All efforts at treating enuresis should be combined with suggestion. One of the most potent factors in the therapy of this condition is the physician's conviction that he is able to effect a cure, and every therapeutic procedure should be introduced with the statement that it will assist the child toward a cure.

Belladonna.—For patients with irritable bladder, belladonna is of great benefit. In order to be effective it should be given in large doses. One may safely start with five drops of the tincture of belladonna (equivalent to 1/600 grain of atropine) three times a day for a 5-year-old child and increase the dosage by 3 drops each day (one drop each dose) until distinct improvement in the urinary symptoms or flushing of the skin appears. It is usually possible to give children with irritable bladder large doses, up to 20 or 30 drops three times a day. No improvement is to be expected until the dosage reaches about 15 drops, three times daily. The dosage should be increased to 20 drops if the child will tolerate it, even though symptoms disappear with a smaller amount. Belladonna should be continued for three to four weeks or longer after the enuresis has ceased in order to permit the habit of voluntary control to become established. Belladonna, by relieving the urgency and frequency, makes the patient more confident of his ability to control the urinary function. In this way the agitation and fear which intelligent children feel is relieved, and a strong psychic factor in the mechanism is lessened. The child should sleep in a warm bed.

Training.—Treatment with belladonna should be combined with training and suggestion. Fluids should be limited in the late afternoon and a dry supper given. During the day an attempt should be made to prolong the interval between voidings for as long a time as possible. The child is awakened once or twice during the night, dressed in bathrobe and slippers and walked to the toilet. Care should be taken that the child is fully awakened when he voids since putting a sleeping child on the toilet has no value as far as bladder training. The number of wakings is diminished as the child improves. Elevation of the foot of the bed may help.

Rewards.—The system of rewards is at times very effective. The child is given a chart on which the days of the week are written and he is instructed to note the dry and wet nights. A gold star is given for each dry night. This method is most effective with children from

5 to 7 years old who may be receiving stars for good behavior at school. It gives the child impressive evidence of improvement.

In diurnal enuresis, when the ammoniacal smell is offensive, rinsing the underclothes in a boric acid solution is helpful.

Krasnogorski[16] has obtained good results in the treatment of enuresis by the administration of 5 gm. of salt immediately before bedtime. The treatment is based on the fact that salt leads to a retention of water. The evening meal is given about two hours before bedtime and contains little salt but fluids as desired. The fluid given with the low salt meal is excreted by the time the child goes to bed. Immediately before the child goes to sleep he is given a sandwich made with salted herring, smoked salmon, bacon or swiss cheese, and salt butter. The amount of salt administered in this way is sufficient to reduce the urinary secretion during the night to 100-125 c.c., an amount insufficient to start the reflex of emptying the bladder. Rosenson and Liswood[17] have obtained cures in twenty-seven out of twenty-eight patients treated by this method. Dr. Harry Greenwald writes that he has obtained "some astonishing results with this method of treatment, especially in children from 6 to 10 years of age. In others, the method has failed miserably."

In cases resistant to treatment a urologist should be consulted.

SUMMARY

Three mechanisms are to be considered in the pathogenesis of enuresis, the "irritable bladder," faulty training, and psychologic factors. Two or all three of these mechanisms may be operative in the same patient.

Enuresis occurs most frequently in children with an inherited abnormality in the mechanism of micturition, i.e., irritable bladder. This condition is apparent in infancy and persists throughout life. It manifests itself by frequency and urgency, particularly in response to nervous tension or cold.

Children with irritable bladder are difficult to train. Hence psychologic conflicts around the training situation are more likely to arise than in normal children.

In children endowed with this abnormality in urination psychologic maladjustment frequently expresses itself as enuresis.

An effective remedy for irritable bladder is belladonna, combined with training, suggestion, and adjustment of the psychologic environment. Belladonna, in order to be effective, must be given in large doses.

Enuresis, solely on a psychogenic basis, is rare and is to be distinguished from factitious enuresis, i.e., intentional wetting. Belladonna is useless in this condition.

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FOREIGN BODIES IN THE UROGENITAL TRACT OF CHILDREN

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ALTHOUGH the medical literature is full of reports of foreign bodies in the urogenital tract of adults and children of both sexes, it is surprising the number of cases occurring in children that are brought to the attention of the pediatrician or the urologist only after prolonged treatment based on a mistaken diagnosis. The reason for this we believe to be twofold: 1. Children will seldom, if ever, voluntarily admit insertion of the foreign body before it is discovered, while adults will seek relief and admit their guilt after a short period of discomfort. 2. The possibility of the presence of a foreign body is seldom considered by the general practitioner when these children are examined. Frequent, painful urination with blood and pus in the urine should always make one suspicious of a foreign body and call for further investigation by cystoscopy or roentgenogram. An early diagnosis made in this way will avoid unnecessary suffering and frequently needless complications. When the foreign body is in the bladder, it can frequently be removed by cystoscopic manipulation, but it is sometimes necessary to open the bladder if too long a time has elapsed since the insertion and a hard calculus has formed around the foreign object. We would like to report six cases with the hope of again emphasizing the importance of keeping this condition in mind in the differential diagnosis of all urogenital tract conditions in children.

CASE 1.—M. T., a 5-year-old girl, when first seen complained of painful urination. The urine specimen passed at the office was loaded with pus and also contained a little bright red blood. This latter condition aroused the suspicion of a foreign body, and a roentgenogram disclosed a T-shaped tailor's pin imbedded in a stone which just about filled the bladder (Fig. 1). The stone and pin were removed by suprapubic cystostomy.

CASE 2.—A. F., an 11-year-old girl, complained of pain and frequency of urination for three weeks. General examination revealed normal blood pressure and no temperature rise. Urine contained both blood and pus. The skiagram revealed a hairpin, the exact position of which was determined by cystoscopy (Fig. 2). It was removed transurethrally.

CASE 3.—M. J., a 4½-year-old girl, was brought to the office because of a marked vaginal discharge streaked with blood. Skiagram showed a foreign body in the vagina (Fig. 3). The object, easily removed with a vaginoscope and forceps, proved to be a screw from a bathtub plug.

From the Sarah Morris Children's Hospital of the Michael Reese Hospital and the Cook County Children's Hospital.

CASE 4.—G. E., an 8-year-old girl, was admitted to the hospital because of bleeding from the rectum. Rectal examination disclosed a hard mass anteriorly. X-ray picture revealed the presence of an opaque substance, and a lateral picture proved it to be in the vagina (Fig. 4). On removal it proved to be a large marble.

CASE 5.—A. F., a 5-year-old girl, seen at home, had a history of intermittent bleeding from vagina for past three months. The family physician had diagnosed

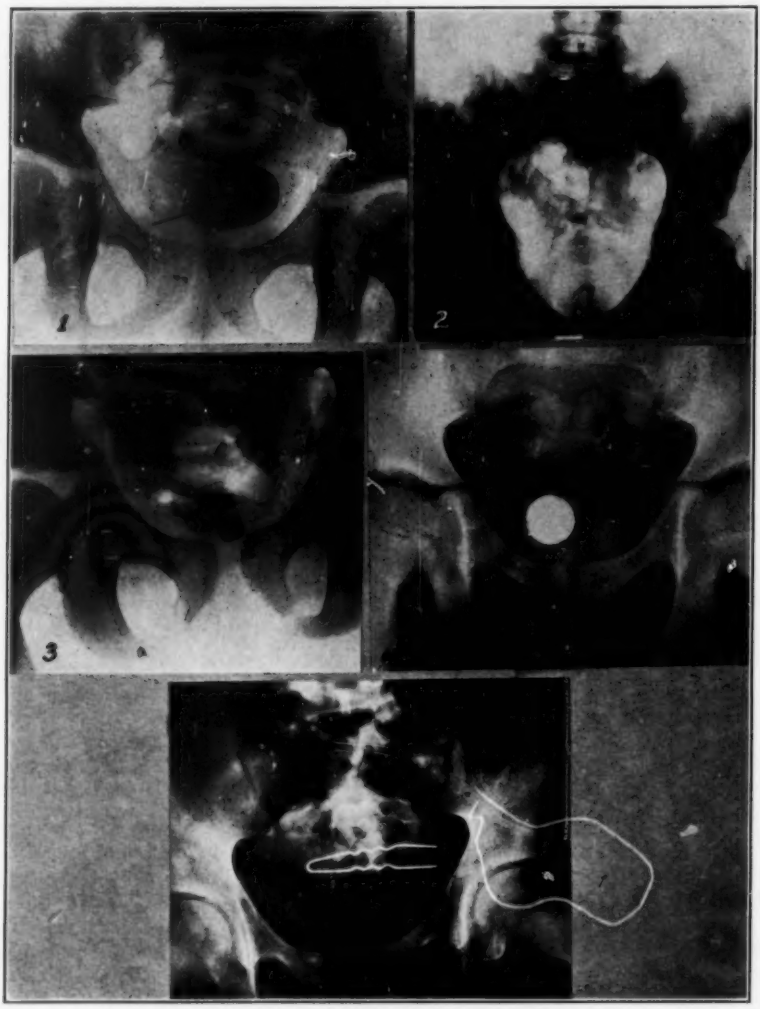

Fig. 1.—Case 1. Tailor's pin in bladder. Embedded in stone.
Fig. 2.—Case 2. Hairpin in bladder.
Fig. 3.—Case 3. Foreign body in vagina.
Fig. 4.—Case 4. Marble in vagina.
Fig. 5.—Case 6. Hairpin in bladder embedded in a soft stone which did not show in the skiagram.

precocious menstruation. The noticeable lack of modesty or fright during the examination proved to be a valuable clue. Too much modesty or fear as well as too little should make one suspicious. Since a cotton applicator passed into the vagina was slightly discolored on removal, a metal probe was inserted and a metallic sound immediately elicited. By the use of a vaginoscope and forceps three foreign bodies were extracted: a penny, a marble, and a button. The child afterwards admitted attempting to remove the objects with a sharp pointed scissors. This accounted for the bright red blood which was mistaken for precocious menstruation.

CASE 6.—H. E., a girl 11 years of age, was admitted to the Cook County Hospital with a diagnosis of hemorrhagic nephritis. Her general condition, however, seemed to be too good for the presence of urine showing so much blood and pus. There was no temperature rise and no elevation of blood pressure. A flat plate of the genito-urinary tract disclosed a hairpin in the region of the bladder (Fig. 5). Cystoscopic examination revealed the presence of the pin surrounded by a stone, the latter not showing in the x-ray picture. The stone, which proved to be a soft one, was crushed and removed with the pin transurethrally by Dr. Dorrin Rudnik.

If for any reason it is deemed necessary to open the bladder to remove these objects, one should not hesitate to do so, especially in male children. It is a clinical observation that these bladder wounds heal more quickly in children than in adults and the avoidance of traumatizing the small urethras should also be considered.

SUMMARY

Foreign bodies in the urogenital tract of children are not infrequent. Dysuria and hematuria are the chief symptoms. Examination by x-ray and cystoscopy should be done in all suspicious cases. Treatment is relatively simple once diagnosis is made.

104 SOUTH MICHIGAN AVENUE
108 NORTH STATE STREET

ORTHOSTATIC HYPOTENSION

Report of Two Cases in Which the Patients Were Children

Donald L. Gillespie, M.D., Butte, Mont., and
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IN TWO cases observed at the Mayo Clinic there were features which Pollitzer in his book, *Ren Juvenum*, described as orthostatic reaction of the circulatory system.

REPORT OF CASES*

Case 1.—A boy, 11 years of age, came to the clinic because of spells of weakness which had recurred since he had been 3 years of age. The symptoms had become progressively worse during the four months before he came to the clinic. The spells always had occurred while he had been standing, and they always had subsided when he had lain down. They had been characterized by weakness, faintness, dizziness, nausea, pallor, and cold sweats, but syncope had never developed as he always had promptly assumed the horizontal position and had thus perhaps prevented its occurrence. After he had lain recumbent for five to thirty minutes he had been able to go about as usual. Occasionally, during the four months before he came to the clinic, he had had to remain in bed an entire day. During these times his skin had been slightly yellow in color, but he never had been definitely jaundiced.

His past history and his family history were essentially negative. He was an alert, intelligent, cooperative boy. The spleen could barely be palpated below the costal margin. There was no evidence of organic heart disease. The response to pressure on the carotid sinus was normal. The neurologic examination showed nothing abnormal.

The value for the hemoglobin was 15.9 gm. per 100 c.c. of blood; the erythrocytes and leucocytes numbered, respectively, 4,210,000 and 4,400 per cubic millimeter of blood. There was a microcytosis, but the erythrocytes were not of the spherical type characteristic of hemolytic icterus. The fragility of the erythrocytes was normal. The flocculation test for syphilis was negative. The value for the blood urea was 27 mg. per 100 c.c.; for the fasting blood sugar, 106 mg. per 100 c.c.; and for the serum bilirubin, 1.5 mg. per 100 c.c., with indirect reaction. The electrocardiogram was normal. Roentgenograms of the thorax and stomach were normal. Repeated examinations showed the presence of orthostatic albuminuria. As albuminuria which is the result of posture sometimes disappears when the reaction of the urine becomes alkaline (Nassau), he was given alkalies, but the albuminuria persisted.

*Since this paper was written, a third case has been observed by one of us (Gillespie). The patient was a boy, aged 10 years, who had had spells of weakness, dizziness, and pallor, particularly after strenuous exercise, and at one time had collapsed while playing baseball. The blood pressure while the patient was recumbent was 98 systolic, and 58 diastolic. After the patient had stood for fifteen minutes, the blood pressure could not be obtained. The heart rate rose to 118 beats per minute and then dropped to 54 beats per minute, when he had a severe reaction characterized by marked weakness, pallor, and profuse perspiration. The reaction disappeared and the pulse rate and temperature became normal after the patient had lain down. However, the orthostatic reaction in this case, as in the others, could not be obtained consistently.

From the Mayo Clinic.

A sweating test in which heat was applied with an electric baker showed no areas of the body in which sweating was deficient. When the patient was in the recumbent position, the systolic blood pressure was found to average 85 mm. of mercury, the diastolic pressure was 50 mm. of mercury, and the pulse rate was 90 beats per minute. After the patient had been in the erect position for six to eight minutes, both the systolic and the diastolic pressures dropped and the pulse rate increased. Coincidentally with these changes, he began to complain of weakness. At the end of fourteen minutes in the erect position the systolic blood pressure was 55 and the diastolic pressure was 30, the pulse rate was 110 to 130 beats per minute, and the patient was very weak, faint, dizzy, and pale. He perspired and asked permission to lie down. As he assumed a recumbent position, the blood pressure rose to approximately its former level and the pulse rate dropped sharply from 110 to 50 beats per minute. After he had remained in bed three minutes, he felt much better. He again stood erect and again there took place a sharp drop in blood pressure and a return of the symptoms (Fig. 1).

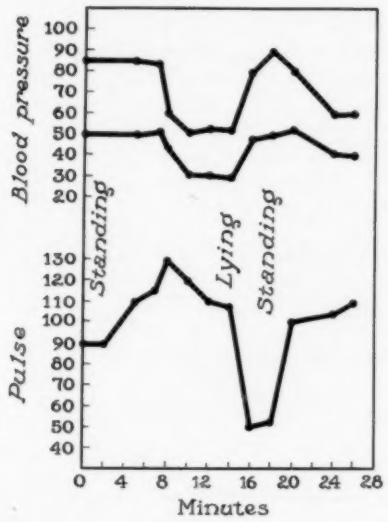

Fig. 1.

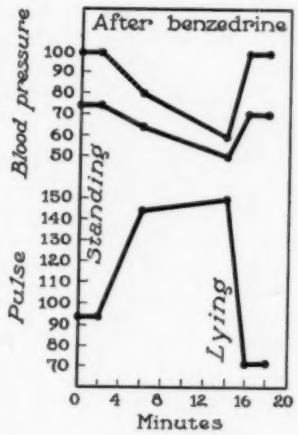

Fig. 2.

Fig. 1.—Reactions of blood pressure and pulse rate while the patient was in the standing and recumbent positions (Case 1).

Fig. 2.—Effect of benzedrine in delaying the orthostatic drop in blood pressure (Case 1).

When the change from the horizontal to the vertical position was made on the tilt table, there occurred only a slight drop in blood pressure and no feeling of weakness in a period of twenty minutes. He was given five doses of 5 mg. each of benzedrine at intervals of two hours. Following this the drop in blood pressure still occurred after standing, but it was more gradual and the feeling of weakness was considerably less marked than it had been (Fig. 2).

He was given six doses of 20 mg. each of ephedrine sulfate at intervals of two hours. Following this, the fall in blood pressure after the patient had been standing was still more gradual and not as great as it had been. The pulse rate rose, as it had before, to a high level (140 per minute). He complained only of very slight weakness (Fig. 3).

A tight abdominal binder was applied, after which there was but very little change in blood pressure while the patient was standing, and the pulse rate did not exceed 104 beats per minute. He complained of no weakness at any time during the half hour he remained standing (Fig. 4). At the beginning of this observation, however, the systolic blood pressure was only 90 mm. of mercury while the patient was in the recumbent position.

Because of the favorable response to the use of the binder, the patient was instructed to wear it continually, except at night. We have heard from him since he was dismissed, and, although he has improved considerably, he was not entirely

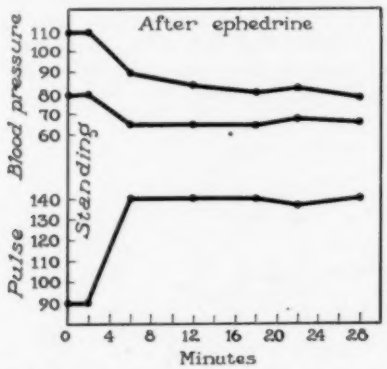

Fig. 3.—Effect of ephedrine which definitely delayed the fall in blood pressure and lessened its degree (Case 1).

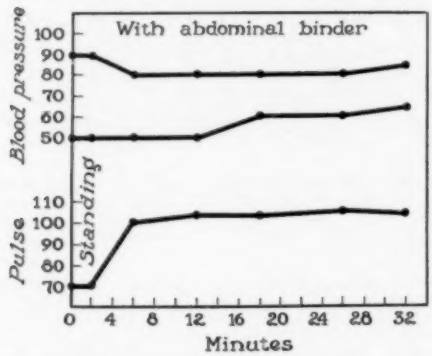

Fig. 4.—Effect of a tight abdominal binder, which was the most effective procedure in reducing the degree of orthostatic hypotension as well as the coincident increase in pulse rate (Case 1).

normal when this was written. He was therefore advised to take ephedrine daily and to continue to wear the binder.

CASE 2.—A girl, 13 years of age, came to the clinic because, during the two years prior to her visit, she had suffered from nausea, headache, palpitation, dyspnea, weakness, and fatigue. All symptoms had been worse when she had been standing than they had been when she had been recumbent. For five months before her admission to the clinic she had remained either in bed or in a chair. She had been unable to attend school during the previous two years.

For five years before coming to the clinic, she had frequently complained of dizziness. Two years and nine months before her visit to the clinic she had had an acute illness; she had had high fever and had been semicomatose for twenty-four hours. After a few days she apparently had recovered. Aside from this, her past history was essentially negative.

Physical examination revealed a well-developed and well-nourished girl. The tonsils were enlarged to a moderate degree. Examination of the eyes showed a refractive error. There was nothing abnormal about the central nervous system. There was no evidence of organic heart disease. Pressure over the carotid sinus elicited the normal response. Electrocardiograms taken while the patient was in the recumbent and standing positions revealed nothing of significance. Examination of the urine collected under the same conditions revealed albumin, grade 1, in both specimens. The concentration of hemoglobin was 13.5 gm. per 100 c.c. of blood, and the leucocytes numbered 8,800 per cubic millimeter of blood. The flocculation test for syphilis was negative. The value for the fasting blood sugar was 69 mg. per 100 c.c., and the value for the blood urea was 26 mg. per 100 c.c. The basal metabolic rates on two occasions were -10 and -11. Roentgenograms of the thorax, head, and stomach were normal. The response of the blood pressure to immersion of the hand in cold water was normal.

While the patient was recumbent, the systolic blood pressure averaged 110 and the diastolic pressure averaged 88; the pulse rate was 90 beats per minute. While the patient was standing, there was only a slight fall in blood pressure at first. After she had stood about fifteen minutes with the blood pressure cuff in place, the sounds became so faint that the blood pressure could not be obtained. The pulse, 170 beats per minute, was weak. About five minutes later the patient experienced a severe reaction, which consisted of nausea, headache, palpitation, dizziness, marked weakness, pallor, cyanosis of the lips, and generalized sweating. While the patient continued to stand erect, a tight abdominal binder was applied. The pulse rate dropped to 120 beats per minute, but the blood pressure could not be obtained. Five minutes after the binder was applied the patient was feeling much stronger, her color improved, the sweating stopped, and she complained only of slight palpitation. The binder was removed and the severe reaction immediately returned. After she had been recumbent for four minutes, all the symptoms disappeared, the systolic pressure was 105, the diastolic pressure was 90, and the pulse rate was 80 beats per minute. It was also noted that while she was standing the left pupil sometimes dilated, and there was a lessening of the force of the retino-arterial pulse. On repetition of standing after recumbency, however, the patient was sometimes able to stand for thirty minutes without a reaction.

Five doses of 5 mg. each of benzedrine were given at intervals of two hours, and following this six doses of 10 mg. each of ephedrine were given at intervals of two hours. After she had stood for about fifteen minutes, the sounds became too faint to obtain a blood pressure reading and the pulse rate increased to 170 beats per minute. After she had stood for thirty-five minutes, she complained of but slight palpitation. She has been instructed to wear the abdominal binder continually, except at night, and to take ephedrine daily.

COMMENT

The advanced type of orthostatic reaction, which has been described by Pollitzer has the following features: when the patient assumes the erect position, the pulse rate is greatly accelerated, but the acceleration becomes somewhat less marked as the erect position is maintained.

When the patient persists in standing after symptoms appear, crisis supervenes, and dizziness, nausea, and eventually collapse occur. In cases in which the disturbance is very pronounced, in which the patients usually are adults, a bradycardia replaces the tachycardia when the patients lie down. The tachycardia is accompanied by a rise in blood pressure, but a critical drop of blood pressure may occur. Sometimes the pulse can hardly be felt in the peripheral arteries.

The syndrome of orthostatic hypotension of adults was first described by Bradbury and Eggleston in 1925. Since then, thirty-nine cases have been reported in the literature. The syndrome is characterized by (1) a consistent, prompt and sharp decrease in systolic and diastolic blood pressures and syncope or marked weakness, when the patient stands; (2) localized anhidrosis; (3) failure of the pulse rate to increase markedly when the patient assumes the erect posture; (4) increased distress during the heat of summer; (5) secretion of larger volumes of urine when the patient is recumbent than when he is erect. In a few cases signs of organic changes in the nervous system have been noted. Other features which have been mentioned are of very questionable significance.

The cases which we have reported differ from the orthostatic hypotension seen among adults in that the pulse rate was markedly increased during the reaction, there was no anhidrosis and the reactions to orthostatism were usually delayed and in the second case they did not always occur. Measurement was not made of the amount of urine secreted in the reclining position in our cases. However, an increased amount is commonly found in cases of orthostatic albuminuria, and this was present in Case 1. Indeed Pollitzer claims that orthostatic albuminuria is a part of the orthostatic reaction which he describes. The conditions underlying this reaction may vary not only among different individuals, as indicated by variation in symptoms, but also in the same individual, as was exemplified in Case 2, in which the patient did not react every time she assumed the erect position.

The question as to whether our cases should be classified with the syndrome of orthostatic hypotension cannot be definitely decided. They included the main feature of the condition, namely, a fall in the blood pressure while the patients were standing. The differences, namely, the absence of anhidrosis, and acceleration of the pulse rate on standing, and the inconstancy of the reaction, may possibly be ascribed to the youth of the patients, to differences in the degree of reaction, or to permissible variability of manifestations. In the broad sense both groups of cases may be considered examples of the "orthostatic reactions" of Pollitzer, who ascribed the condition to a peculiarity of the nervous control of the circulatory system.

In cases in which the patients are adults, there is definite evidence of failure of parts of the autonomic sympathetic nervous system to function, and there is some evidence to show that this failure is the result of organic changes in the sympathetic nerve tracts. Among children it may be a simple sympathetic dysfunction, congenital or developmental.

The therapeutic approach has been directed mainly against the results of the reaction, that is, maintenance of the blood pressure by means of ephedrine, benzedrine, or a tight abdominal binder. In our cases the ephedrine was found to be preferable to benzedrine. The mechanical treatment, the use of a rather tight abdominal binder, not only prevented the onset of the severe reactions but also relieved them, and was the most effective procedure.

ENDEMIC TYPHUS FEVER

Report of a Case in a Female Child, Age 11 Years

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EPIDEMIC typhus is a highly communicable disease with a high mortality and occurs more frequently in cold or temperate climate in winter and spring. It is associated with filth and overcrowding and is transmitted from man to man by the body louse (pediculus humanus). It was first differentiated from typhoid by Gerhard[1] in 1837.

Endemic typhus,[2] a milder form, was first described and differentiated from typhoid by Brill in 1897; sometimes it is called "Brill's disease." Epidemiologic studies in this type indicate a rodent reservoir with accidental transmission to man by some blood sucking ectoparasite of rats or mice, as the flea or mite. This mild type of typhus has been observed in New England and south along the coast to the Mexican border.

The following case was admitted to the contagious disease service of one of us (H. A. R.). Prior to admission the child was in a local hospital in the borough where, because of the rash, contagion was suspected. The Health Department diagnostician was called, and the child was transferred to the contagious pavilion.

CASE REPORT

D. H., a white female, aged 11 years, was admitted April 13, 1937, and was discharged April 26, 1937.

The illness started six days prior to admission, April 7, with headache followed by severe malaise, back pain, sore eyes and occasional vomiting. Headache was intermittent for the next four days with fever and prostration. Complaints at the time were drowsiness, anorexia, thirst, vague abdominal pains, and emotional upset manifested by nervousness and crying. A blotchy eruption appeared on the arms on April 12, five days after onset, and the following day spread to the trunk and lower extremities. There was no history of the child having traveled anywhere. The family history was negative. There was no evidence that any one in the family or among the neighbors had had typhus or anything similar. There was no overcrowding; as a matter of fact, the neighborhood is of the middle class. Further investigation revealed that in the vicinity where the child lived and played, large numbers of rats were known to habitate. The child was transferred from a local hospital to the Queensboro Contagious Pavilion of the Queens General Hospital with a tentative diagnosis of measles. Soon after admission the Health Department diagnostician who transferred the child suggested that typhus fever be considered.

Physical examination on admission revealed a moderately prostrated, acutely ill child, with fetid breath, dry lips and tongue, temperature of 103° F., pulse rate of 126, and respiration rate of 24.

From the Queensboro Contagious Pavilion, Department of Pediatrics of the Queens General Hospital, W. C. A. Steffen, Medical Director.

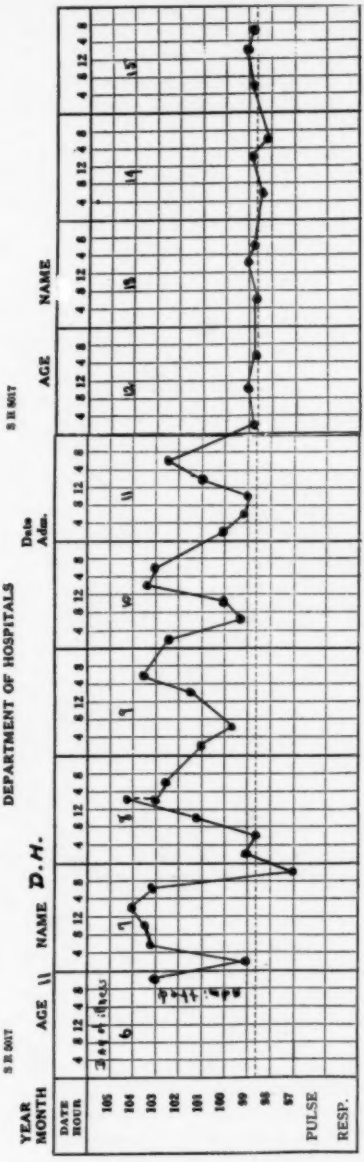

Fig. 1.

Skin: The rash was mainly on the upper extremities, also on trunk and lower extremities. It consisted of small, blotchy, slightly raised lesions, maculopapular in character, deep pink in color, the larger ones with a lighter central area. There was a considerable number of nits present in the hair, particularly in the axilla and head. No lice could be found. Child was immediately deloused.

Eyes: Moderate bulbar conjunctivitis and some photophobia were noted. Mouth and Throat: The lips were dry and cracked and the breath had a marked fetid odor. The tongue was dry and furred. There were no Koplik spots on the buccal mucous membrane. The pharynx was glazed and reddened. The tonsils were of moderate size and congested. The lymph glands showed slight generalized lymphadenopathy. The spleen was not palpable.

Course.—The child's temperature was spiking and remittent, ranging from 98.6° F. in the forenoon to 104° F. in the afternoon for five days, with gradual drop in level to 102.4° F. on April 18, the fifth day. Thereafter the temperature remained normal and continued flat until the patient was discharged (Fig. 1).

The pulse followed temperature course.

Fig. 2.

The rash became more macular than papular with time and finally became definitely macular. The day after admission, April 14, it spread to the palms and soles and then appeared on the face. The following day the rash was a dark pink color, faded on pressure, and about four days after admission began to fade. By April 20 the rash was faintly present, mainly on the extremities and back. On April 22, small vesicles and blisters appeared on the soles of the feet and fingers of the hands, followed by desquamation which was quite marked at time of discharge. The macular lesions faded and on discharge remained only slightly on fingers and forelegs with slight desquamation (Figs. 2 and 3).

The lymphadenopathy gradually subsided and was completely gone at the time of discharge.

The throat congestion subsided in a few days.

Subjective symptoms: Prostration was present only on first two days of the hospital stay, and patient complained of a headache only once, two days after admission.

TABLE I

LABORATORY FINDINGS

Blood Counts		Wassermann—neg.	Agglutination Tests
Hemoglobin	80 per cent	Kline—neg.	4/16/37
			typhoid—neg.
4/14/37		Blood culture	paratyphoid A and B—neg.
R.B.C.	4,300,000	4/15/37—neg.	brucella—neg.
W.B.C.	8,300	Feces—neg.	tularemia—neg.
Polymorphs	85%		
Lymphocytes	15%		Proteus X19 (Weil-Felix)
			4/14/37—1:80 dil. pos.
4/17/37			4/22/37—1:160 dil. pos.
Hemoglobin	80%		4/26/37—1:160 dil. pos.
R.B.C.	4,800,000		
W.B.C.	7,600		
Polymorphs	76%		
Lymphocytes	24%		

Fig. 3.

The urine was negative.

Nose and throat cultures were negative.

X-ray film of the chest, April 16, showed exaggerated bronchial markings and thickened roots.

After the drop in temperature her stay in the hospital was uneventful. The patient was discharged on April 26, 1937, and was sent to a convalescent home.

Diagnosis.—Endemic typhus fever.

Measles was first considered, because the patient was sent in with that diagnosis and because of a superficial resemblance. The onset and dis-

tribution of the rash, the type of temperature curve, the course of the illness, the marked prostration, and the absence of Koplik spots precluded measles. There was no evidence of meningitis or meningeal irritation, otherwise meningococcic meningitis might have been suspected. The negative blood culture ruled out sepsis. Typhus fever was suspected on admission because of the history of the peculiar rash and its distribution, the nits, prostration, and headaches. The health department authorities corroborated our suspicions and assisted in the various agglutination tests. The positive agglutination with the proteus X19 (Weil-Felix) in the dilution of 1:160 established definitely the diagnosis of one of the typhus group, which includes epidemic and endemic typhus fever and Rocky Mountain spotted fever.

Savoor, Castaneda and Zinsser[3] reported Weil-Felix reactions on 596 individuals not suffering from the typhus group. They obtained a positive reaction in about 16 per cent in dilutions of 1:40 and 4 per cent in dilutions of 1:80. One may conclude that, as with other laboratory aids, too much reliance cannot be placed on the Weil-Felix reaction in the absence of clinical signs. It might very well be that some of these individuals who gave positive Weil-Felix reactions in the higher dilutions may have had typhus that was not recognized at the time.

On June 24, two months after discharge, while she was in the convalescent home, the United States Public Health Service performed the protection test for special differentiation for Rocky Mountain spotted fever; it was negative. This ruled out Rocky Mountain spotted fever and established the diagnosis of typhus. The facts that there was no other case of typhus fever present in the family, among neighbors or friends, or reported in the borough this year and that the course was mild are arguments against the epidemic type, since in the epidemic type there is always evidence of transmission from man to man. The fact that there were nits present is probably coincidental. The child gave a definite history of playing in the vicinity where large numbers of rats habitate.

Rocky Mountain spotted fever instead of being spread by the body louse, flea, or rodent is a tick-borne disease. The clinical differentiation of typhus fever from the spotted fever group is very thoroughly discussed by Toomey,[4] Dyer, Rumreich and Badger,[5] and Rumreich.[6] Clinically they are almost indistinguishable. Epidemiologic and immunologic study is necessary to differentiate between them. There is also an eastern type of Rocky Mountain spotted fever due to the American dog tick.

Endemic typhus is said to be rare in children. In 138 cases reported by Blatteis,[7] the youngest was 14 years and the oldest 72 years old. However, out of a total of 1,029 cases reported by Baker, McAlpine, and Gill[8] in Alabama in 1932 to 1933, 119, or more than 10 per cent were under 14 years of age.

TABLE II

ALABAMA, 1932 TO 1933

DISTRIBUTION OF 1,029 CASES OF TYPHUS FEVER BY RACE, SEX, AND AGE[8]

AGE (YR.)	WHITE		COLORED		TOTAL	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
0- 4	4	10	0	0	4	10
5- 9	20	15	1	1	21	16
10-14	43	31	2	2	45	33
15-19	67	24	3	0	70	24
20-24	46	26	1	4	47	30
25-34	105	51	10	11	115	62
35-44	117	52	7	3	124	55
45-54	74	46	8	4	82	50
55-64	42	20	4	2	46	22
65-74	21	11	0	1	21	12
75+	3	2	0	0	3	2
Not stated	66	56	9	4	75	60
Total	608	344	45	32	653	376

The mortality for children is given as less than 2 per cent, males, 1.3; and females, 1.5 per cent.

In a very recent publication Caplan and DeRosa[9] reported the first case of endemic typhus occurring in Connecticut, in a three-and-one-half-year-old white child. In New York City only two cases of typhus fever in children were reported in the last five years. Both were between 10 and 15 years of age. In the Borough of Queens, New York City, with a population of 1,250,000 this was the only case of typhus irrespective of age reported to date for 1937, and the fourth case reported in the last five years, inclusive of 1937. The other three were adults.

TABLE III

ENDEMIC TYPHUS IN NEW YORK CITY, 1932 TO 1936*

YEAR	NO. OF CASES	CHILDREN	DEATHS
1932	14	0	1 (M. 55-60 yr.)
1933	12	1 (10-15 yr.)	0
1934	12	0	1 (F. 50-55 yr.)
1935	24	1 (10-15 yr.)	1 (M. 55-60 yr.)
1936	20	0	1 (M. 60-65 yr.)
Total	82	2	4

*Figures by courtesy of Dr. Samuel Frant, Director and Epidemiologist, Bureau of Preventable Diseases, Department of Health, New York City.

Of the total of 82 cases reported there were 4 deaths and all were in patients over 50 years of age.

We feel that more cases of endemic typhus occur, particularly in children, than are either diagnosed or reported, especially when one considers that in Alabama they constitute more than 10 per cent of the reported cases. A more liberal use of the Weil-Felix test and an appre-

ciation of its value in all unusual and suspicious cases with peculiar maculopapular or petechial rashes with fever will uncover many cases that we have all missed.

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SEDIMENTATION TIME AND OTHER BLOOD FACTORS IN THE NEWBORN INFANT

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THE phenomenon of the sedimentation of blood was well known to physiologists and pathologists of the seventeenth and eighteenth centuries. But the study of blood changes was relegated to the background when the cellular pathology of Virchow came into vogue. A paper by Fähraeus[1] in 1917 on sedimentation velocity renewed interest in this subject. Now sedimentation determinations are extensively used for diagnostic and prognostic purposes in many diseases. However, there has been very little work done on sedimentation rates in the newborn infant. This study was undertaken to establish normal sedimentation values for infants during the first ten days of life and to correlate these findings with other blood constituents.

Blood for these experiments was obtained by internal jugular puncture. Sedimentation time was determined by the Linzenmeier method using 2 mg. of potassium oxalate per cubic centimeter of blood as an anticoagulant. Serum albumin and globulin were determined by the Greenberg modification[2] of the Wu and Ling colorimetric technique.[3] Erythrocyte and platelet counts and hemoglobin and cell volume determinations were made on peripheral blood obtained by heel puncture. Hemoglobin was determined by the Sahli method and cell volume by the method of Van Allen.[4]

TABLE I

SEDIMENTATION TIME

AGE	NO.	SEDIMENTATION TIME (HOURS)			
		MEAN	P. E. MEAN	STANDARD DEVIATION	RANGE
Under 24 hours	12	106	±11.0	±54	30-185
1 day	31	57	± 7.0	±52	3-180
2 days	27	41	± 4.7	±32	8-108
3 days	19	45	± 7.7	±44	6-120
4 days	18	35	± 6.0	±31	4-103
5 days	26	20	± 3.7	±21	5- 96
6 days	18	28	± 4.7	±25	3- 86
7 days	16	14	± 2.0	±10	4- 37
8 days	20	14	± 2.0	±11	4- 47
9 days	17	13	± 1.5	± 6	3- 23
10 days	14	10	± 1.1	± 6	4- 24
11-20 days	21	11	± 1.7	±10	2- 40

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DISCUSSION

Sedimentation time results in 239 cases are presented in Table I as averages of day-to-day changes. These figures show a high sedimentation time with considerable individual variations, giving a wide range for each group and a high standard deviation. There is no definite correlation with the maternal health or with icterus neonatorum. Infants at birth show a very high sedimentation time of about one hundred hours, which falls rapidly until it averages about ten hours at ten days. Silzer,[5] on blood obtained from the umbilical vein, found the sedimentation rate in 91.75 per cent of his cases was over twenty-four hours. Ellenberg's results[6] in a very small series of infants correspond to our range.

Serum albumin and globulin figures with their probable errors, standard deviations, and ranges are presented in Table II. They do not show any definite trend in their day-to-day changes and do not seem to bear any definite relationship to the sedimentation time. Values of serum albumin and globulin for newborn infants are lower than those for adults. Our values compare favorably with the results obtained by Darrow and Cary,[7] on a series of 20 infants, 3 days old and older, with albumin averages of 3.75 ± 0.05 and globulin averages of 1.78 ± 0.07. Being averages of a series of 239 determinations on newborn infants, our figures may be useful as normal values for this age group.

TABLE II

SERUM, ALBUMIN AND GLOBULIN

AGE	ALBUMIN (GM. %)				GLOBULIN (GM. %)			
	MEAN	P.E. MEAN	STANDARD DEVIATION	RANGE	MEAN	P.E. MEAN	STANDARD DEVIATION	RANGE
Under 24 hr.	3.53	±0.099	±0.36	3.2-4.3	1.90	±0.067	±0.24	1.6-2.4
1 day	3.82	±0.079	±0.54	3.1-5.1	1.77	±0.040	±0.27	1.4-2.3
2 days	3.37	±0.039	±0.21	3.0-3.7	1.76	±0.041	±0.22	1.4-2.3
3 days	3.56	±0.074	±0.40	3.0-4.3	1.75	±0.042	±0.22	1.4-2.3
4 days	3.42	±0.063	±0.31	3.0-4.0	1.79	±0.027	±0.13	1.6-2.0
5 days	3.30	±0.077	±0.43	2.4-4.0	1.66	±0.063	±0.35	1.1-2.3
6 days	3.51	±0.056	±0.29	3.1-4.0	1.81	±0.043	±0.22	1.5-2.2
7 days	3.46	±0.087	±0.39	3.0-4.3	1.86	±0.067	±0.30	1.3-2.3
8 days	3.67	±0.100	±0.46	3.1-4.9	1.88	±0.055	±0.26	1.3-2.3
9 days	3.64	±0.052	±0.30	3.0-4.1	1.90	±0.028	±0.16	1.6-2.2
10 days	3.64	±0.074	±0.33	3.3-4.4	1.77	±0.020	±0.09	1.5-1.9
11-20 days	3.72	±0.063	±0.31	3.2-4.2	1.62	±0.043	±0.21	1.3-2.1

Averages of erythrocyte and platelet counts, hemoglobin content, and cell volume are presented in Table III. Our findings on erythrocyte and platelet counts conform in general with those of Lucas and co-workers,[8] Lippman[9] and Merritt and Davidson.[10] Our hemoglobin values are slightly lower than those of Mugrage and Andersen[11] on cord blood.

TABLE III

ERYTHROCYTES, PLATELETS, HEMOGLOBIN, AND CELL VOLUME

AGE	NO.	R.B.C. (MILLIONS)	% HEMOGLOBIN	GM. HEMOGLOBIN	CELL VOLUME %	PLATELETS (THOUSANDS)
Under 24 hr.	4	5.41	124	17.3	63.0	302
1 day	9	5.26	119	16.6	61.0	269
2 days	10	5.34	113	15.8	65.4	257
3 days	11	5.28	116	16.3	60.8	263
4 days	11	5.50	115	16.1	60.7	272
5 days	10	5.03	106	14.8	58.7	302
6 days	10	5.11	110	15.3	59.9	278
7 days	10	5.11	106	14.9	58.4	313
8 days	10	5.11	118	16.5	63.2	292
9 days	10	5.12	113	15.8	56.7	338
10 days	6	5.15	112	15.7	58.0	347
11-13 days	4	4.89	99.5	13.9	50.0	259

The erythrocytes and cell volume show a gradual decline from birth to 10 days. There are wide fluctuations in cell volume from individual to individual in the same age group, becoming less marked with advancing age. Cell volume changes seem to parallel changes in the sedimentation time, and this is perhaps the major factor governing sedimentation time in this age group.

Mean corpuscular values for hemoglobin content in micromicrograms, volume in cubic microns and hemoglobin concentration in per cent and color index, volume index, and saturation index were calculated from figures in Table III and are presented in Table IV. Since reports differ as to the normal average values for hemoglobin, cell volume, and erythrocyte count in newborn infants, averages of adult values for men and women as given by Osgood[12] (14.5 gm. hemoglobin,

TABLE IV

CORPUSCULAR VALUES AND INDICES

AGE	MEAN CORPUSCULAR			INDICES		
	HEMOGLOBIN CONTENT IN $\mu\mu$ GM.	VOL. IN CU. MICRONS	HEMOGLOBIN CONCENTRATION IN %	COLOR	VOLUME	SATURATION
Under 24 hr.	32.0	116.2	27.5	1.10	1.39	0.79
1 day	31.6	115.9	27.2	1.09	1.38	0.79
2 days	29.6	122.3	24.2	1.02	1.47	0.70
3 days	30.9	115.2	26.8	1.05	1.37	0.77
4 days	29.3	110.5	26.6	1.01	1.29	0.77
5 days	29.4	117.0	25.2	1.01	1.39	0.73
6 days	29.9	117.0	25.6	1.03	1.40	0.73
7 days	29.1	114.0	25.5	1.01	1.38	0.73
8 days	32.2	123.5	26.1	1.12	1.48	0.76
9 days	30.9	110.5	27.9	1.07	1.32	0.81
10 days	30.5	112.7	27.1	1.05	1.35	0.78
11-13 days	28.5	102.2	27.8	0.98	1.21	0.81
Average	30.3	114.8	26.5	1.05	1.37	0.76

42 per cent cell volume, and 5 million erythrocytes) have been arbitrarily selected as standards for calculating the indices.

Pepper and Farley[13] give mean corpuscular values for adults, of maximum 32, minimum 27, and average 29.5 for hemoglobin content in micromicrograms; maximum 94, minimum 80, and average 87, for volume in cubic microns; and maximum 38, minimum 33, and average 35, for hemoglobin concentration in per cent. Mugrage and Andersen[11] found mean corpuscular values of 35.1 for hemoglobin content, 108.9 for volume, and 32.2 for hemoglobin concentration, in cord blood. Our values for hemoglobin content, maximum 32.2, minimum 28.5, and average 30.3, compare favorably with the adult values and are lower than those for cord blood; those for volume, maximum 123.5, minimum 102.2, and average 114.8, are much higher than adult values and compare well with those for cord blood; and those for hemoglobin concentration, maximum 27.9, minimum 24.2, and average 26.5, are much lower than both adult and cord blood values.

The color index in newborn infants shows an average value of 1.05 $\pm$ 0.05, volume index, an average value of 1.37 $\pm$ 0.20, and saturation index, an average value of 0.76 $\pm$ 0.06. These indices do not show much variation from birth to 10 days of life.

SUMMARY

Sedimentation time, serum albumin and globulin, erythrocyte and platelet counts, cell volume, corpuscular constants and color, volume and saturation indices from birth to 10 days of life are reported.

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COMPARATIVE VALUE OF COD-LIVER OIL AND AN EMULSION OF PERCOMORPH-LIVER OIL IN THE PREVENTION OF RICKETS

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DURING the fall and winter of 1935-1936 a study was made of the antirachitic value of a malt emulsion containing a small amount of highly potent fish-liver oil. The vitamin A and D content was the same as a standard cod-liver oil.* One teaspoonful of the emulsion contained 9,200 U.S.P. XI units of vitamin A and 900 U.S.P. XI units of vitamin D. It was the purpose of the study to obtain an antirachitic as effective as cod-liver oil, but one which was more palatable and more readily assimilable.

The infants used in the study were from one of the poorer sections of New York City where home conditions in many instances were especially bad. About half of the cases were negro and Puerto Rican, the remainder being Italian, Irish, Hungarian, with a scattering of other white peoples. Most of the infants were first examined while still in the hospital as newborn infants or at the dispsensary shortly after discharge from the hospital. A few were accepted for study at 6 weeks of age. The infants were seen for examination and regulation of their feedings at two- or four-week intervals by two clinic pediatricians, and in addition were personally examined by the author at approximately monthly intervals in order to record their general development and possible evidences of so-called "clinical rickets." A full-time graduate public health nurse was in attendance at the dispensary and also made frequent home visits to see that all instructions were carried out as given. The mothers were supplied with accurate measuring spoons of ½ or 1 teaspoon size. No case is included in the report if there was any question about the mother's full cooperation.

X-ray pictures of the wrists were taken, as far as possible, at 4, 6, and 8 months of age, although an unusually severe winter made it impossible for many mothers to take their babies to the hospital at the stated time. The technique used in taking the roentgenograms was that which was recommended by Eliot.[1] The final interpretations of the x-ray films were made independently by Dr. J. M. Lewis and Dr. David H. Shelling, and we are very greatly indebted to these investigators for their assistance and advice.

From the newborn infant service of Metropolitan Hospital, New York City, and the feeding clinic of the Metropolitan Hospital Dispensary.

*1800 A and 175 D units per gram.

About one-third of the infants were breast-fed for five months or longer. Whenever formulas were used, they consisted of boiled whole milk, water, and dextrimaltose. Beta lactose was prescribed in a few instances. Vitamin-D-free cereals were started generally when patients were 5 months of age, and vegetables about one month later. Due to a misunderstanding in the clinic, egg yolk was unfortunately prescribed in a few cases at 5 to 6 months of age. (The vitamin D content of egg yolk has been variously estimated at 18-27 U.S.P. units per average market egg by one group of observers[2] and 13-32 units by another.[3]) A check-up at the end of the study showed that in many instances the egg yolk had been given to the infants, irregularly or not at all. Orange juice was routinely ordered at one month of age, but economic conditions existing in the homes of our patients were such that the regular purchase of an antiscorbutic was frequently an impossibility. This was evidenced by the fact that the x-ray films revealed evidence of mild scurvy in twelve patients, although this was not demonstrable clinically.

When the babies were first examined, they were alternately put on the percomorph emulsion or standardized cod-liver oil.* Each group was divided so that approximately one-half received daily 450 U.S.P. XI vitamin D units, and the other half, 900 units daily. No attempt was made to determine a minimal prophylactic dose.

Part of the infants taking the emulsion received it directly from the spoon, the others getting it in the formula. The cod-liver oil was given directly from the spoon.

RESULTS

The emulsion was universally well taken whether in the formula or by mouth. In no case did it cause any vomiting or even regurgitation. In a few instances when the emulsion was started during the first 10 days of life, it apparently caused loose stools and excoriated buttocks, but this did not occur when the medication was started after 3 weeks of age. With the cod-liver oil, trouble was experienced in twenty-three cases, the oil in most instances being poorly taken or spit up shortly after administration. Many methods of giving the emulsion were tried on babies not included in this study, and it was concluded that for formula babies the best way was to put the emulsion directly into the bottle. The oil apparently was miscible with the cream of the milk and was readily redispersed throughout the formula on shaking. For breast-fed babies the emulsion was most readily given in water or orange juice. There was no apparent separation of oily droplets even after long standing.

The emulsion was originally given to 141 infants and the cod-liver oil to 108. Of these, approximately one-half were lost because of

*Supplied by Mead Johnson & Company, Evansville, Ind.

moving from the neighborhood or poor cooperation. The final report is made on 66 infants given emulsion and 60 given cod-liver oil, and includes only infants born after September 15. The study was concluded at the end of May. The average age at the beginning of the study was 14 days, and at the end of the study 7.1 months (Table I). Height and weight records showed that most of the infants grew rapidly, the average age for doubling the birth weight being between 4 and 4½ months.

Examination of the x-ray films revealed that of the sixty infants who received cod-liver oil, three showed evidence of mild rickets. Two of these (an American white and a Chinese) had received 450 units daily, and one (a Puerto Rican) had received 900 units daily. In each case the oil was reported as having been "poorly taken" or "fairly well taken," and the failure of the oil to protect in these cases may have been due to the difficulty in its administration.

Only one of the sixty-six infants given the percomorph-liver oil emulsion showed x-ray evidence of mild rickets. This was a full-term white infant of Norwegian parentage who had received regularly 450 units of emulsion from the spoon since 3 weeks of age. X-ray films taken at 4 months and 4¾ months of age both showed rickets of a "very mild degree." It was later discovered that because a diagnosis of rickets had previously been made on a former child in this family, the mother drank two or three glasses daily of a vitamin D milk of 400 unit potency during her entire pregnancy. In addition and contrary to instruction, she had used vitamin D milk of 400 unit potency in making up the formula for her infant. (This is the only instance of an infant receiving a vitamin D milk included in this report.) It is noteworthy that the one infant in this group who developed even a mild degree of rickets received a dosage of approximately 750 units daily. The very small dosages frequently recommended as prophylactic of rickets cannot be regarded as 100 per cent effective.

No case of moderate or severe rickets occurred in the entire study.

DISCUSSION

The levels of vitamin D employed in this study were higher than those frequently used, as it was not the object of our investigation to determine a minimum prophylactic level of vitamin D. Rather we hoped to determine whether a relatively low level in a palatable form and dispersed either in milk or orange juice would be a practical and dependable form of antirachitic medication.

The malt preparation of percomorph-liver oil was readily taken by all the infants, and after three weeks of age caused no gastrointestinal upsets of any nature. In this regard it was superior to cod-liver oil.

From an antirachitic standpoint the malt preparation added to the formula, or in orange juice, was as effective as when it was given by

TABLE I

ANTIRACHITIC	NUMBER OF CASES			NUMBER DEVELOPING RICKETS			WHITE			NEGRO			PUERTO RICAN		
	MALE	FEMALE	TOTAL	MILD	MODERATE	SEVERE	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
Cod-liver oil															
Units 450	18	11	29	3	0	0	10	5	15	5	3	8	3	3	6
Units 900	11	20	31	1	0	0	6	8	14	2	4	6	3	8	11
Malt emulsion percomorph oil															
Units 450	12	19	31	1	0	0	6	7	13	2	5	7	4	7	11
Units 900	23	12	35	0	0	0	12	6	18	6	2	8	5	4	9
Totals entire group	64	62	126	5	0	0	34	26 (10 Italian)	60	15	14	29	15	22	37

mouth. There was some tendency for the oil to rise to the top of the formula, but in the majority of cases it apparently mixed with the cream and was ingested by the infant. None of the oil remained on the sides of the bottle as is the case when cod-liver oil or any oil is directly added to milk or orange juice.

CONCLUSIONS

1. A malt emulsion of highly potent fish-liver oil fed to 66 infants at a level of 450 U.S.P. units daily was found to be equally effective in the prevention of rickets as 450 U.S.P. units of cod-liver oil fed to a group of 60 infants.

2. The administration of 450 U.S.P. units of cod-liver oil or of percomorph-liver oil in the form of a malt emulsion completely prevented rickets in 96 per cent of the 126 infants (aged 1 day to 10 months) followed through the months of October to June. This level of vitamin D as cod-liver oil did not prevent mild rickets in four infants of the oil-treated group. In these cases difficulty in administration was encountered. Only one case of mild rickets was observed in the malt emulsion group.

3. When this 450 U.S.P. unit level of vitamin D in the form of the emulsion was dispersed in milk or orange juice, it was found to be just as effective as when given by mouth.

4. The malt emulsion on the basis of palatability, ease of administration, and ready digestibility was judged to be superior to cod-liver oil as an antirachitic supplement.

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THE CONDUCT OF A PEDIATRIC PROPHYLAXIS CLINIC

Modifications in Procedures Designed to Reduce the Anxiety of Children

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ONE of the most significant trends in current medicine is the increasing tendency of the physician to consider and treat the needs of the patient as a whole. Because of a greater and more penetrating awareness of the part which emotions play in all human ailments, there is a growing conviction that in every symptom, whether predominantly physical or mental, there are both somatic and psychological factors. The physician no longer thinks in terms of physical versus mental symptoms, or of organic versus psychogenic syndromes. He has a new concept of his patient: he thinks of the human being as an organism in which soma and psyche function concomitantly; in other words he conceives of his patient in terms of the total organism.

A children's prophylaxis clinic offers a fruitful field for the application of this point of view because of the pressing need in such a clinic for the reduction of the emotionally painful experiences frequently encountered by children receiving prophylactic treatment. It is common knowledge that after having tests or inoculations in a prophylaxis clinic, many a child returns to the general clinic or to some other outpatient department either temporarily or permanently conditioned against physicians because of his previous subjection to "the needles" (the term used by the average child in our clinic in discussing his prophylaxis experiences with the consulting psychiatrist). Frequently he begins to cry at the sight of the physician's "white coat," and for a long time afterward he presents a practical problem of medical handling which requires the expenditure of considerable time and tact in regaining the cooperation of the child. Moreover, procedures involving the use of needles are unusually effective agents for precipitating or aggravating latent anxiety in the child, and all too often for generating anxiety in a patient who until then has never shown this symptom.

Any procedure which contributes to the generation or aggravation of anxiety warrants thorough study and appropriate modification in an effort to eliminate as far as possible its undesirable features, for anxiety is one of the most distressing symptoms one can experience. Every neurosis begins in childhood, and many psychiatrists are of the

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opinion that at the center of every neurosis there is anxiety. Among the various situations in which neurotic anxiety originates and develops, the following are important: (1) situations in which the child becomes insecure because he fears losing the love of those upon whom he is dependent, and (2) situations in which he fears injury, particularly injury at the hands of some other human being. It is the latter type of fear which is stirred up by such procedures as skin tests, vaccination, and inoculations of various types.

Too often the adult forgets that in the child the functions which are called judgment are still in the process of developing. The child lacks the background of experience which enables him to evaluate correctly what is going on about him, consequently, being stuck with a needle is to him a more ominous proceeding than is actually the case. This was well illustrated by a five-year-old boy who suddenly evinced anxiety a few weeks after a visit to the prophylaxis clinic when he chanced upon a magazine cover portraying a prominent actor, dagger in hand, in the rôle of Hamlet. In a frightened voice the child remarked, "He's got that *thing!*" Then impulsively picking up a linear piece of steel from a toy construction set and jabbing the physician in the arm, he said vindictively, "I'll give *you* the needle."

The magnitude of the problem of emotional "trauma" engendered by procedures in the prophylaxis clinic is better appreciated when one recalls that the number of children going through repeated experiences of this kind is large. For example, the average number of children attending the regular weekly prophylaxis clinic of the Department of Pediatrics at New York Hospital varies from 30 to 80, and from 1935 to 1937 inclusive, 6,601 children passed through this clinic.

With the above considerations in mind and in the interest of the mental health of the large numbers of children who of necessity must experience these prophylactic procedures, it seemed that here was a challenge and an opportunity to see what could be done to so modify the management of such a clinic that the emotional "trauma" to the patients would be reduced to a minimum.

The clinic in which the project was undertaken provides prophylactic service to patients referred from the general pediatric clinic of which it is a part, and from all other clinics of the outpatient department for children. At 8 to 9 months of age, the majority of the general clinic patients are routinely referred for immunization. At the first visit the children receive a Schick test, smallpox vaccination, and 1 c.c. of diphtheria toxoid. A return visit is made in two weeks for a reading of the vaccination and for the second injection of 1 c.c. of toxoid. In addition to these routine procedures, Mantoux tests are performed on children who have failed to receive them in the general

clinic. Prophylactic pertussis vaccine, cold vaccine, and typhoid vaccine are also given at the request of either the doctors in the general clinic or the parents.

A survey of the literature for the purpose of deriving the benefit of recorded experience of other physicians in this aspect of pediatrics was disappointing. Though a thorough-going search was made, it was surprising to find how little material on this subject was available —surprising, yet easily understood in the light of the tendency in the past for psychiatry and other branches of medicine to go their separate ways.

As a preliminary step the pediatrician in charge of the prophylaxis clinic and one of the child psychiatrists on the staff of the outpatient department of pediatrics spent considerable time in observing all aspects of the clinic while in actual operation, concentrating on a study of ways in which the clinic procedures might be modified to mitigate the fears of children attending the clinic. The routine conduct of the whole clinic was studied—admitting room, waiting room, and treatment rooms. Brief conferences were then held with the physicians, medical students, and nurses working in the clinic. At those conferences the psychiatric aspects of the problems involved in the clinic were presented, and the psychological reasons for the proposed changes in routine were explained. With the receptive attitude thus engendered, the new orientation was welcomed by a substantial number of the workers, and shortly all members of the staff were cooperating enthusiastically in the experiment.

Following a trial period in which various ideas regarding psychiatric management were tested, those proving sound and fruitful were retained and have now become part of the regular routine. The results have been so gratifying that it seemed worth while to give an account of the changes instituted, simple though they were.

In the main, those changes are as follows:

1. The cooperation of the admitting physician who makes the routine throat examination was enlisted in dealing understandingly with the children as they entered the clinic. He was requested to use the tongue depressor as skillfully as possible and to avoid resorting to physicial restraint of any kind unless absolutely necessary, for we know that one of the primary sources of anxiety in the infant and young child is the sense of helplessness it experiences when there is physical interference with its activity. Instead, an effort is made to foster security in the child and to get him to cooperate voluntarily in the examination. Such judicious handling of the patient in the admitting room is of especial importance because it usually determines the emotional "set" which the child carries to the other clinic experiences during the visit. It is particularly indicated in the case of the child in whom full-blown neurotic anxiety has already developed and

whose fears are set off by some anxiety signal such as the sight of the clinic door or whatever else it may be with which he has come to associate his painful experiences at the clinic. For example, when one little 4-year-old girl saw the bus on which she always traveled to the clinic, she habitually cried in terror, "No more, no more!" In such a situation it is essential for the admitting physician to deal patiently and knowingly with the child in order to meet at least the minimum obligation of seeing that he does not aggravate the anxiety.

These relatively simple changes have resulted not only in a substantial reduction of fear with its consequent rage reactions on the part of the patients, but also a decrease in the anxiety and exasperation of the mothers. This, too, is important because the emotional security of the accompanying parent is essential to the child who is going through a disturbing experience. To the child, the parent is a being in whom he has utmost confidence. If the parent shows insecurity, the child's universe tumbles.

2. Next, arrangements were made for decreasing the waiting time. This factor is especially important in the case of return visits of children who have previously been inoculated and who consequently know what is ahead of them. One of the most effective means of reducing the waiting time was the simple expedient of staggering appointments. The results of this one change were gratifying, not only in the substantial gains immediately related to our aim, but in the general smooth conduct of the clinic. There was less crowding, less commotion and excitement, and a definite improvement in the spirit of everyone concerned—patients, parents, and members of the staff.

3. In the waiting room toys, books, and games appropriate for children of various ages were made available, as well as magazines for the parents. In addition, with the use of equipment borrowed from the general pediatric clinic, an especially inviting playroom with a recreation aide in charge was set up adjacent to the treatment rooms on the day of the prophylaxis clinic. By this means, pleasant associations, instead of only unpleasant ones, were established with the part of the clinic where the injections were given.

4. The child who comes to the clinic with neurotic anxiety which has already burst through his defenses and who fails to respond to the measures described above is given special attention by the psychiatrist in an attempt to reduce his distress. If the excessive emotional reaction persists, notwithstanding this attention, the patient is taken to the treatment room at once, the situation being considered a psychological emergency.

5. In the treatment rooms the exhibition of apparatus is reduced to a minimum. Syringes and needles are routinely kept from sight by the simple device of covering the trays with pieces of gauze. Only one child at a time is admitted to each treatment room. This prevents

the spread of fear by suggestion and obviates the patient's witnessing another child's inoculations, a situation which too often is interpreted as unjust punishment or as a physical assault. The parent remains in the room throughout the treatment except in the cases of parents being so anxious themselves that it seems wiser for them to leave while the injections are being made. Routine exclusion of the parent was originally tried, but it was later given up on the basis that the mere separation from the parent stirred up anxiety in the child in addition to anxiety related to his fear of injury associated with the inoculations.

6. Before proceeding with the skin tests or inoculations, the pediatrician spends a few minutes explaining to the parent what is about to take place and why, and a similar explanation is given to patients more than 4 years of age because children old enough to understand are less disturbed by a painful but necessary procedure and less resentful when they can see some good reason for having it done. Suddenness of presentation and lack of preparation for a painful stimulus increases emotional response. It was revealing to learn how many of the older children had little understanding of what the "injections" were all about, and we doubt if our clinic is much different from others in this respect, for usually the emphasis has been placed on sound technique and getting work done.

7. Truthfulness is essential in answering the child's questions regarding the possibility of pain associated with the procedure to be carried out. The all too prevalent custom of attempting to reassure the child with such statements as, "It isn't going to hurt," is barred. Instead, the inquiring child is honestly given some such reply as, "Yes, it will hurt, but not for long." The practice of deception in an emotionally charged experience such as this is destructive, for not only does it increase the unpleasantness of the treatment per se, also it destroys the child's confidence in those previously trusted, and it fosters conflict between standards and performance with respect to honesty.

8. The physical restraint necessary in the case of babies receiving injections is reduced to a minimum. For example, no child is held down until all preparations for the injection are complete, because as previously stated, interference with physical activity is particularly prone to evoke fear in the infant and young child. The parent is never permitted to participate in restraining the child because of the possibility that the child may interpret such restraint as unjust punishment at the hands of the parent. The parent occupies an important position in the psychological development of the child, and anything which jeopardizes constructive parent-child relationships is contraindicated.

9. The question of the site to be chosen for the injection is important. Because of the conflicting claims of technique and the child, it is not an easy one to decide. From the psychological point of view

the arm is probably preferable to the buttock, among other reasons, because the latter is the area of the body about which children are most sharply threatened. Because so many children fear punishment on the buttock, it is unfortunate for the physician to inflict pain there unnecessarily. However, in the case of infants, practical considerations have decided us in favor of giving the intramuscular injections in the buttock, as that area offers a larger muscle group.

10. An important and as yet unsettled question is the number of injections to be given at one visit. Is it less "traumatic" from a psychiatric point of view to give as much of the required prophylaxis as possible at one time, or is it better to dilute the experience by spreading the injections over several visits? We believe the question needs considerable study before it can be answered. In the absence of a generally accepted point of view regarding this matter, it has been customary in the clinic at New York Hospital to give toxoid, vaccination, and Schick test at one visit when the child is about 9 months old.

11. When the injections have been completed, the nurse immediately gives the child his freedom. If for example, the patient is a baby who has had to lie prone, he is allowed to sit or stand up at once in order to terminate promptly the feeling of helplessness at the hands of a larger, more powerful human being which is so terrifying to him. In this connection it is important to bear in mind that in the generation and development of neurotic anxiety, dangers which the child experiences at the hands of a *human* foe, so to speak, are peculiarly prone to increase his anxiety.

12. As soon as the prophylactic procedure is completed, the physician who injected the needle spends a few minutes reassuring the child that he is a friend. This is an apparently trivial matter but it makes considerable difference in the emotional tone with which the patient leaves the clinic and that with which he returns for future appointments.

13. On leaving the treatment rooms, the younger children are immediately taken to the adjoining playroom where they are engaged in play with the toys. Promptly giving them this opportunity for pleasant association helps them to understand that the clinic is primarily concerned with their well-being and happiness. It is gratifying to find how quickly the fearful child responds to this plan. Besides its value to the individual patient, it has an excellent effect on the general atmosphere of the clinic, for it reduces the amount of crying set off by suggestion. It is not uncommon to have as many as twenty or more children in the playroom adjoining the treatment rooms with long periods free from all crying. In the case of the child who, because of neurotic anxiety, fails to respond to reassurance on leaving the treatment room and persists in noisy manifestations of fear and rage, a prompt exit from the general waiting room by way of a side corridor

to an adjoining room is arranged to prevent his distress from arousing fear in the other children. As opportunity arises, such a child is referred for psychiatric care.

In conclusion our experience has led us to the opinion that keeping in mind the welfare of the child as a whole, emotional as well as physical, and to that end making relatively simple changes in routine, it is possible to reduce the emotional "trauma" which children experience in the prophylaxis clinic and thus prevent the generation and aggravation of anxiety. The changes instituted in the routine handling of our patients and the psychological reasons underlying them are described above. They involve the expenditure of additional time, but not an excessive amount, and the workers in the clinic are unanimous in their belief that, in view of the benefit to the children, it is time well spent.

CANDY-COATED TONGUE DEPRESSOR

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THE throat examination of a young child is greatly facilitated by the use of candy coating on the tip of the tongue depressor blade which makes it resemble a lollipop.

Strong orangewood tongue blades (Perfection brand), of the size and shape regularly used for examination of children's throats, are dipped in orange flavored candy syrup so that one inch of the tip becomes coated with a hard candy about ⅛ inch thick. Other flavors than orange have been tried, but orange is the most universally popular. This must be of the proper consistency and hardness so that in warm and damp weather the candy does not become sticky. The candy-covered tongue depressors are then wrapped in wax paper in packages of six. This can be done by any confectioner who understands the requirements.

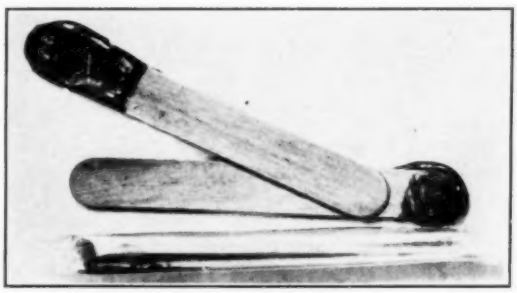

FIG. 1.

The psychologic advantage of the candy stick in the examination of children can be readily appreciated. At the beginning of a general examination a child is given this stick, with the assurance that it is candy, which he can suck as a lollipop. By the time the pediatrician is ready to look at the mouth and throat, the child has forgotten the fear which so many children have acquired from previous unpleasant experience with tongue depressors. The dreaded part of a physical examination can be accomplished before the child realizes what is being done. The use of force to restrain a kicking and screaming child results too often in dislike of the doctor's office and the doctor. With the aid of candy all this is avoided.

In the writer's experience with the use of the procedure the trouble and expense connected with turning tongue depressors into lollipops

has been repaid many times over. Not only are the young patients willing and anxious to return for another visit, but parents appreciate the relief from embarrassment often caused by forcible throat examinations of their children. Once young patients have become accustomed to the pleasure of an orange lollipop, it is of great importance that the doctor never allow the supply to become exhausted.

In rare cases this device may fail to charm a child who does not like candy. Again it is sometimes unsuccessful when it is found necessary to depress the tongue to the point of gagging. There is no doubt that when this simple expedient is employed the end of the day finds the pediatrician less exhausted.

Critical Review

PROBLEMS IN MATERNAL HYGIENE AND THEIR RELATION TO PEDIATRICS

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IT HAS been pointed out repeatedly that little of the marked improvement in infant mortality during the past two decades is attributable to decrease in neonatal deaths. Undoubtedly, this has been because the factors accountable for a large proportion of these neonatal deaths are concerned with heredity, the prenatal period, and delivery, conditions over which the pediatrician has no control. Future progress in reducing the incidence of neonatal deaths, and perhaps even of stillbirths, will be greatly influenced by the cooperation of pediatrician and obstetrician. For this reason, a review of recent progress in several aspects of obstetrics which are intimately concerned with the fate of the infant and in maternal hygiene as a phase of public health service should be of interest to the pediatrician.

I. THE MOTHER VERSUS THE BABY?

In general, it may be stated with reference both to the prenatal period and to delivery that good obstetric management of the mother is also good treatment for the baby. Nevertheless, it might be well to consider the occasional exceptions to this general rule. There are a number of situations in which the interests of mother and baby might conceivably conflict. For instance, in the matter of therapeutic abortion for maternal indications, such as severe and decompensated heart disease, severe hypertension, or the nephritides, the decision to do a therapeutic abortion involves destruction of a potential infant in the interest of the mother. Practically, however, when there is proper indication for therapeutic abortion, the prospect of obtaining a live baby is poor, even if pregnancy is allowed to continue.

Again, a conflict of maternal and fetal interests may arise when severe maternal toxemia develops prior to the last three or four weeks of pregnancy. Here the obstetrician may be confronted with increasing maternal hypertension, albuminuria, edema and symptoms, with a baby of estimated weight from two to five pounds. On the one hand, the continuance of pregnancy may offer the mother an immediate prospect of eclampsia or abruptio placentae and a remote prospect of permanent damage to her vascular system or kidneys. On the other hand, it is very important in the interests of the baby that it be of reasonable maturity at birth (if possible over four pounds, and preferably over five pounds). Superficially, there would seem to be a conflict of maternal and fetal interests under these circumstances. However, in the few such cases in which the mother while under treatment is in imminent danger, there is also considerable risk that the fetus will succumb in utero due to impairment of placental circulation. Thus, it usually works out in such cases that as the maternal risk of continuing pregnancy becomes

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excessive, the prospects for even the very premature baby become better in the premature nursery than in utero. Not uncommonly in severe cases, nature solves the problem for us with the spontaneous onset of premature labor. However, if she fails to do so, the timely termination of pregnancy by suitable means often reduces the risks for mother and baby alike.

Recently developed roentgenographic methods for cephalometry in utero[1, 2, 3] offer promise of assistance in determining more accurately the maturity of the baby in utero. The methods involve determination of the occipitofrontal diameter or the volume of the fetal head. There is good correlation between the occipitofrontal diameter of the head as measured by x-ray in utero and the measurement determined directly following delivery. There is also reasonably good correlation between the occipitofrontal diameter and the weight of the infant, a relationship which is closer with premature and immature babies than with larger ones. The former are, of course, the ones for whom the procedure is important.*

There are certain accidents of labor, notably prolapsed cord, in which there arises a true conflict of maternal and fetal interests. In the interest of the baby, when prolapsed cord occurs, immediate delivery is indicated. Since prolapsed cord often occurs early in labor, this may mean delivery by cesarean section, for rapid pelvic delivery through the incompletely effaced and dilated cervix is associated with high fetal mortality as well as considerable risk to the mother. Thus, in order to safeguard the interests of the baby, the mother may be subjected to a procedure (cesarean section) which offers a risk to her life more than ten times that of normal pelvic delivery.

In the many instances of so-called fetal distress during labor which are not caused by prolapsed cord, operative pelvic interference early in labor offers considerable increase in morbidity and mortality for the mother and is also frequently ineffectual in saving the infant. Further, when the cause of apparent fetal distress is not obvious, the prospect for a live and normal baby even by cesarean section is far from 100 per cent. Indeed, a true situation in which good treatment for the mother cannot be made to coincide with good treatment for the baby is relatively uncommon.

II. ADVANCES IN PRENATAL AND POSTNATAL PHYSIOLOGY AND PATHOLOGIC PHYSIOLOGY

Rhythmic respiratory movements of both animal and human fetuses in utero are said to have been described by a number of observers for over two centuries; notably by Winslow (1781), Scheel (1798), Beclard (1815), Preyer (1885), Ahlfeld (1888), and Wislocki (1920).† Although many of these observations in retrospect appear convincing, such movements had never been accepted generally as a normal physiologic

*It is the writer's opinion that in general, the survival rate of premature infants is more a function of gestational age than of birth weight; babies of 36 or more weeks' gestational age have an excellent chance of survival, irrespective of birth weight. For support of this view, Clifford's figures[29] show that of live-born premature babies, the mortality is lowest in the group from toxemic mothers. These babies are often thin and more mature in relation to their birth weights than other premature infants. Conversely, the obstetrician and pediatrician are occasionally confronted with a premature infant of 6 or more pounds birth weight. The mortality rate in a group of premature babies from cardiac mothers correlated better with gestational age than with birth weight.[28]

†For a review of the literature on the subject, the reader is referred to the recent paper of Bonar, Blumenfeld, and Fenning: "Studies of Fetal Respiratory Movements: I. Historical and Present Day Observations" in the American Journal of Diseases of Children, January, 1938.

occurrence by clinicians until recent observations with new methods under more satisfactory experimental conditions have reopened and largely settled the question in the affirmative. Thus, Barcroft and Barron,[4] Snyder and Rosenfeld,[5-8] and more recently Bonar, Blumenfeld and Fenning[9, 10] have been able to demonstrate these movements in animal fetuses in utero by motion pictures. Snyder and Rosenfeld obviated the influence of anesthetics upon the fetus in utero by transection of the maternal cord.

The respiratory movements first appear when the fetus is still quite immature. They are not constant but tend to occur more frequently as term is approached. Snyder and Rosenfeld have made a number of observations upon the nature of these movements and their responses to variations in the blood gases of the mother, as well as to the therapeutic doses of analgesics, sedatives, and anesthetics given to the mother. These experiments have been confirmed in part and extended by Bonar and his co-workers. Some of these observations may be summarized as follows:

1. The respiratory movements of the fetus in utero are associated with circulation of amniotic fluid in the pulmonary tree; for India ink injected into the amniotic sac rapidly diffuses into the lung if these movements are present. It fails to diffuse in this manner if the respiratory movements are inhibited.

2. Both hyperventilation and induced anoxemia in the mother tend to slow or stop fetal respiratory movements.

3. If the fetal respiratory mechanism is at rest, the inhalation by the mother of 5 or 7½ per cent carbon dioxide in air or oxygen for fifteen minutes fails to induce fetal respiratory movements. It does not produce a consistent or striking effect upon fetal respiratory movements which are already established.

4. Ether, paraldehyde, barbiturates, and morphine given to the mother in doses which do not appreciably interfere with maternal respiration markedly depress or completely inhibit intrauterine respiratory movements of the fetus. However, clamping the umbilical cord usually stimulates or initiates respiration in fetuses under these conditions.

These observations appear to have important bearing upon the mechanism of onset of postnatal respiration. The mechanism would appear to be an adaptation of a previously established one to a new environment, rather than the abrupt occurrence of respiration as a new postnatal function. The observation that maternal anoxemia decreases or inhibits fetal respiration in utero would hardly have been anticipated if the view expressed by Barcroft[11] that the onset of postnatal respiration is in response to oxygen need is correct. Nor does the lack of fetal response to the breathing of carbon dioxide by the mother offer basis to justify the common clinical practice of giving apneic, asphyxiated babies 5 or 10 per cent carbon dioxide as a respiratory stimulant to initiate respiration.

The great sensitivity of the intrauterine respiratory mechanism to analgesic, sedative, and anesthetic drugs given to the mother is of considerable interest in view of the increasing use of analgesic and amnesic drugs during labor, as well as anesthesia at delivery. This observation is in accord with the growing clinical impression that premature babies whose mothers have had considerable analgesia and anesthesia prior to delivery have difficulty with establishing and maintaining satisfactory respiration.

This type of experiment offers a new approach to the study of respiration in the newborn. A new chemical or humoral mechanism no longer is needed to explain the first postnatal breath. In the words of Eastman,[12] "Instead of being an attempt to start something new, the treatment of apnea at birth now becomes an effort to preserve and safeguard a sensitive mechanism already in existence."

The establishment of intrauterine respiratory movements as a normal function would appear to call for a re-evaluation of aspiration of amniotic sac contents in utero as a cause of postnatal respiratory difficulties and neonatal death. It is clear both clinically and at autopsy that the aspiration in utero of viscous and particulate material from the amniotic sac, such as meconium, blood, and vernix, is a frequent finding both in stillbirths and in neonatal deaths, especially when they follow evidence of fetal distress during labor or difficult delivery. Further, in many cases, the mechanical obstruction caused by these substances is sufficient to account for the asphyxia.

However, whether the aspiration of amniotic fluid itself without a significant amount of viscous and semisolid material deserves the emphasis formerly placed upon it is more debatable. In this connection, the studies of Farber and Sweet[13] and Farber and Wilson[14] are of interest. The former examined the lungs of 124 babies who had died from two hours to five weeks after birth and found large amounts of vernix and cornified epithelial cells in 15 per cent, smaller amounts in 73 per cent, and no such material in only 12 per cent. In addition to demonstrating vernix and cornified epithelial cells in the lungs of these babies, they described an asphyxial membrane in a number of cases which tightly lined the terminal bronchiole, alveolar duct, and alveolus. The finer structure and staining reactions of these asphyxial membranes indicated that they had arisen from vernix and cornified epithelial cells from the amniotic sac. From correlation of clinical histories with autopsy findings, they concluded that . . . "the greater and more prolonged the intrauterine asphyxia, with aspiration of amniotic sac contents and resultant interference later with extrauterine respiration, the larger is the size and greater the number of membranes in the lung." The solution of the role played by aspirated amniotic fluid and debris in neonatal asphyxia would seem to lie in the answers to two questions: First, to what extent and depth does amniotic fluid and particulate matter gain access to the pulmonary tree during normal physiologic intrauterine respiratory movements? Second, to what extent does interference with placental circulation and asphyxia in utero increase the respiratory excursion of the fetus to permit access of particulate matter ordinarily not present in amniotic fluid (meconium) or ordinarily filtered out perhaps by the epiglottis (vernix and cornified epithelial cells)?

In a personal communication, Farber and Wilson state that their pathologic and experimental studies incline them to substitute the term "movements of respiratory muscles" for "respiratory movements," for they believe that the latter term is not accurately descriptive of the movements observed. Their recent studies incline them to the belief that under normal conditions in utero there is no true "tidal flow" of amniotic sac contents into the fetal pulmonary alveoli of sufficient magnitude to alter the lung to any important extent. They feel that if a true tidal flow existed, the lungs of all babies should contain large amounts of amniotic sac contents. Such, in their experience, is not the case.

This viewpoint is at variance with that of Snyder and Rosenfeld that the tidal flow of amniotic fluid during intrauterine respiratory movements is of sufficient depth to serve the purpose of expanding and dilating the alveoli and elastic walls of the future air passages. Further work is necessary to clarify this point.

A series of studies upon blood gases in mother and newborn infant by Eastman[15-18] has added to our understanding of apnea and asphyxia in the newborn and has aided in devising rational methods for prevention and treatment of these conditions. As he has shown, asphyxia in the newborn infant is associated with findings in the fetal arterial blood of (1) markedly diminished oxygen saturation, (2) increased carbon dioxide tension, (3) increase in lactic acid, and (4) decreased alkalinity. In general, the greater the clinical degree of asphyxia, the greater are these changes, so that for severely asphyxiated babies, the oxygen saturation of arterial blood may fall from a normal of about 50 per cent to around 5 per cent, the carbon dioxide tension may double, the lactic acid may arise from about 30 to nearly 100 milligrams per cent, and the pH of the blood may fall below 7.1. Indeed, Eastman finds no fundamental difference, other than in the degree of these changes, between clinically livid and pallid asphyxia.

Since in apneic asphyxiated babies there is already a considerable excess in carbon dioxide tension, Eastman has pointed out that the use of carbon dioxide for the initiation of respiration is not rational. Further, although moderate degrees of oxygen need may be the normal stimulus to postnatal respiration, many of these asphyxiated babies with markedly diminished oxygen saturation do not breathe. The practical considerations which arise from these observations, as well as from those of Snyder and Rosenfeld and of Farber, are that certain essential features in the treatment of apnea and asphyxia in the newborn should be kept clearly in mind.

1. Nothing should be done to aggravate the state of shock or collapse —no vigorous shaking, spanking, or cold water duckings.

2. A clear airway should be provided and maintained. This involves gentle removal of mucus, meconium, and viscous fluids from the mouth, nose, and pharynx. At times, intratracheal intubation and aspiration of mucus and meconium are necessary. This is easily done after a little practice with a No. 10 to No. 14 soft rubber catheter. The baby should be placed in a basinette with the head inclined downward some five to ten degrees, and may be advantageously placed on the abdomen. It is occasionally necessary to repeat the aspiration of material from the pharynx and trachea at intervals for hours.

3. If respirations do not begin spontaneously in three or four minutes, gentle artificial respiration and use of oxygen are indicated. If no equipment is available, the artificial respiration may be done by gentle mouth-to-mouth insufflation of air into the baby's lungs. This method has the advantage that the equipment is always available. It has the disadvantages that the baby might contract a pulmonary infection, or that with over-enthusiasm on the part of the resuscitator, the pulmonary alveoli of the recipient may be ruptured. In the management of the asphyxiated newborn infant, it has become increasingly clear that the primary indication is not for vigorous external stimuli, but rather to provide and maintain a clear air passage, and to supply oxygen in some way to the circulation. Whether this be accomplished by the mouth-to-

mouth technique or by one of the several more elaborate mechanical devices[19] is of secondary importance.

4. The body temperature should be maintained. During resuscitatory procedures, this is best accomplished by immersing the baby in a warm tub.

In the establishment of respiration, the use of carbon dioxide, as well as the intravenous use of drugs (coramine, alpha lobeline), to stimulate respiration have been rather disappointing. After respiration has become established, the use of oxygen-carbon-dioxide mixtures in combatting atelectasis is often helpful.

III. TRENDS IN THE CONDUCT OF LABOR AND DELIVERY

Type of Delivery.—The generally increasing tendency to terminate labor prematurely and artificially by hazardous pelvic operative procedures, such as midforceps, high forceps, and version and extraction, and the increasing incidence of cesarean section, have been properly condemned by many teachers and experienced clinicians. It has been pointed out that morbidity and mortality among both mothers and babies are greatly increased by the unnecessary employment of such methods, especially in the hands of the inexpert. Study of the results of so-called prophylactic procedures has served to re-emphasize a number of points in the conduct of labor and delivery which bear on the welfare of the baby as well as the mother. These may be presented as follows:

1. In the hands of experts, the use of perineal or outlet forceps does not increase the risk to either the mother or the baby. On the contrary, the prevention of a prolonged second stage of labor by this procedure occasionally saves a baby through avoidance of asphyxia or intracranial hemorrhage. However, this does not apply to the casual accoucheur, for it is difficult or impossible to teach him to differentiate between safe low or outlet forceps and murderous midforceps or high forceps.

2. The interests of the premature baby are furthered by preventing prolonged trauma during labor. The use of episiotomy and forceps upon all premature babies who are not delivered promptly and easily *after the cervix is fully dilated and the head is on the perineum* seems indicated as a measure to reduce the incidence of intracranial hemorrhage.[20, 21]

3. The fetal and maternal morbidity and mortality are excessive following midforceps, high forceps, version and extraction, and breech types of delivery in all hands. With suitable management of labor, the first three operative procedures rarely should be indicated. The incidence of breech presentations in labor may be considerably reduced by the performance of external version at antenatal examinations after the seventh month of pregnancy.

4. Pelvic delivery through the incompletely dilated cervix is almost always unnecessary and is a great hazard to both mother and baby.

5. The performance of cesarean section offers no assurance of a live and sound baby. Thus, Irving[22] in a review of the subject calculated the average fetal mortality among 3,037 reported cases as 8.5 per cent. This is double the mortality for all types of delivery combined. The risk for the baby is particularly great in two types of case. When there has been considerable antepartum hemorrhage, as for example, in placenta previa or premature separation of the placenta, the loss of premature babies delivered by cesarean section is high. Even though the fetal heart is of good rate at the beginning of the operation, a con-

siderable percentage of premature babies is lost through stillbirths and neonatal deaths. The mortality may be somewhat reduced by the avoidance of preliminary medication and by the use of local anesthesia, although the condition of some of these patients does not permit local anesthesia. The fetal mortality is also high when cesarean section is performed after prolonged tests of labor.

Analgesia and Anesthesia.—It has been stated that the use of analgesic drugs during labor increases the incidence of operative deliveries. This is probably true among primiparas. However, when analgesic medication is used intelligently during labor, the reason for the increase of "operative" deliveries is that perineal resistance is not so effectively overcome, because the patient may not push as effectively as when fully conscious. The first stage of labor and descent of the head onto the perineum is not often interfered with. Thus, the incidence of outlet forceps delivery, which in properly trained hands is not hazardous either to mother or baby, is increased. On the other hand, it should be pointed out that in difficult and prolonged labor, the judicious use of analgesic drugs may serve to permit continuance of labor until the cervix is fully dilated and the presenting part is low (conditions which permit safe delivery of the baby) without the physical and mental exhaustion which so often leads to *premature* and *dangerous operative interference* in this type of labor in the conscious and suffering patient.

This would appear to be the experience at the Boston Lying-in Hospital. Coincident with the introduction of routine use of analgesic drugs during labor, the total incidence of operative deliveries has remained about the same; but the incidence of midforceps, high forceps, and version and extraction have greatly decreased. There has also been a decrease in the incidence of cesarean section. Coincidentally, as will be subsequently mentioned, the stillbirth and neonatal death rates have decreased.

The use of analgesic and amnesic drugs during labor, such as the barbiturates, scopolamine, morphine, ether, and paraldehyde, combined with surgical inhalation anesthesia at delivery has resulted in less active newborn babies. The initial period of apnea is undoubtedly prolonged, and the activity and general muscular tone are usually depressed. Some of these combinations of drugs, especially those including morphine late in labor, are more depressant than others. It will be recalled also that Rosenfeld and Snyder report that doses of such drugs which do not impair maternal respiration in rabbits may stop intrauterine respiratory movements in fetuses. Although the babies of medicated mothers are often somewhat apneic and hypotonic, one must not infer from this alone that the stillbirth and neonatal death rates are increased by the proper use of these drugs in labor. Undoubtedly, although the baby can be dangerously and perhaps fatally poisoned by the injudicious use of analgesics during labor, both stillbirth and neonatal death rates have been considerably reduced in a number of large obstetric institutions coincidentally with the introduction of the routine use of analgesic drugs during labor.

Clifford and Irving[23] report a decrease in both stillbirth and neonatal death rates at the Boston Lying-in Hospital which is coincident with the introduction of the routine use of analgesics during labor (various combinations of barbiturates, scopolamine, rectal ether, and paraldehyde, and inhalation anesthetics at delivery). Stillbirth and neonatal death

rates in this institution prior to and after the introduction of routine analgesia in labor are shown in Table I. It may be seen from the table that the routine use of analgesia during labor and anesthesia during delivery need not be incompatible with a very low stillbirth and neonatal death rate.

TABLE I

STILLBIRTH AND NEONATAL DEATH RATES AT THE BOSTON LYING-IN HOSPITAL*

In 1931 the routine use of analgesic drugs (principally barbiturates and scopolamine) during labor was begun. (Rates are expressed per 1,000 births.)

	1913-22	1923-32	1933	1934	1935	1936	1937
Total loss of viable babies (stillbirths and neonatal deaths)	--	51	47	46	41.8	35.1	35.8
Stillbirths	--	28	28	26	23.3	29.9	22.8
Total neonatal deaths	30	23	19	20	18.5	13.2	13.0
(a) Premature (1-5 lb.)	15	12	10	10	11.1	8.0	7.0
(b) Mature (5 lb. +)	15	11	9	10	7.4	5.2	6.0

*From the annual reports of the visiting obstetrician.

Observations of Eastman[18] concerning the effects of various types of inhalation anesthesia at the time of delivery upon the condition of the infant at birth are of practical interest. Although its use was not recommended because of potential danger to the mother, chloroform at the time of delivery exerted no demonstrable effect upon the oxygen saturation of fetal blood.

Ether anesthesia produced a slight decrease in the oxygen saturation of fetal blood but not in sufficient degree to injure the fetus through anoxemia. Nitrous oxide and oxygen mixtures would appear to be potentially more dangerous to the fetus than either chloroform or ether. When mixtures of 85:15 or weaker were administered to the mother for periods of less than five minutes, moderate degrees of fetal anoxemia were found, but the normal term infant was not harmed. However, mixtures of 90:10 or stronger administered over periods which exceeded five minutes resulted in marked fetal anoxemia in about one baby out of three. Occasionally, profound asphyxia neonatorium resulted.

It thus appears that of the common anesthetics, ether offers less likelihood of injury to the baby than nitrous oxide and oxygen. The latter, although safe from the standpoint of the baby if used in concentrations less than 85:15, definitely predisposes to asphyxia in the infant when greater concentrations are used for more than very brief intervals.*

With reference to the delivery of premature babies, it is becoming increasingly apparent that the use of analgesics and sedatives during labor, as well as deep surgical anesthesia at the time of delivery, are prejudicial to the interests of the baby. Clifford has shown that the use of morphine in the few hours prior to delivery increases the neonatal mortality among prematures. There is a growing feeling that in cesarean section for premature babies, local anesthesia without preoperative medication best suits the interests of the baby.

In general, with reference to trends in the use of analgesia and anesthesia during labor and delivery, it may be stated: (1) In experienced hands, the proper use of both analgesic drugs during labor and anesthesia

*From the standpoint of avoiding asphyxia in the baby, ethylene and cyclopropane offer advantages over other anesthetics. However, the special training necessary for the administration of them, and the special equipment and precautions which are necessary to prevent explosions limit the use of these gases.

at the time of delivery need not jeopardize the chances of survival of the mature baby. (2) The use of analgesic drugs, particularly opiates, and deep anesthesia prior to the delivery of premature babies seems to be undesirable. The weight of evidence would seem to indicate that in the hands of experts, in institutions with suitably trained nursing personnel, the use of properly chosen analgesia during labor is not incompatible with very low stillbirth and neonatal death rates. However, none of the present methods are perfect, and it cannot be too strongly emphasized that the injudicious and indiscriminate use of analgesic drugs in the home and in institutions without properly trained personnel is hazardous both to mother and baby.

The question has been raised repeatedly whether the use of analgesic drugs during labor might have remote effects upon the growth and mental development of the child. (It is, of course, recognized by all that sufficiently prolonged apnea can result in irreparable cerebral damage.) No follow-up study on a group of babies whose mothers were medicated in labor has been reported. However, at the Center for Research in Child Health and Development of the Harvard School of Public Health, a consecutive series of more than two hundred babies born at the Boston Lying-in Hospital of mothers under these conditions of analgesia and anesthesia has been carefully studied from the standpoints of physical growth and mental development. The first of this group of babies is now seven years of age, and the youngest under one year. Health and nutrition histories, as well as physical examinations including orthopedic, roentgenographic, and psychometric tests, have been made at regular intervals on these babies since birth. The data on the growth and development of these children have not as yet been published, but it may be stated here that there has been no undue incidence of physical or mental disorders which might conceivably be attributed to poisoning in utero or prolonged asphyxia at birth.

Thus, among trained obstetricians in properly equipped institutions, it would appear that the use of analgesia during labor, and a relatively high percentage of simple outlet forceps deliveries is a satisfactory procedure for both mother and infant. However, over 80 per cent of the women of the United States are delivered either by general practitioners, most of whom have had no special training in obstetrics, or by untrained midwives. In addition, 60 per cent of deliveries are conducted in the home under conditions unsuited to elective operative interference and analgesia. Under these conditions, our attitude from the standpoint of public health policy must be ultraconservative regarding the use of analgesic drugs and the casual employment of operative delivery, even so-called "outlet forceps."

IV. PUBLIC HEALTH PROGRAMS IN MATERNAL HYGIENE

It is perhaps not surprising that public health progress in maternal hygiene should have lagged somewhat behind that in child hygiene. In the first place, it has been more difficult to devise an effective maternal hygiene program which would draw a sharp line between preventive services to be included and therapeutic services to be excluded. Besides, effective obstetric case work (delivery nursing service and provision of physicians for delivery) is relatively expensive. Among the majority of patients cared for by general practitioners, the application of modern standards of prenatal and delivery care necessitates the expenditure of

an amount of time by the practitioner which is not justified by the fees which local customs and economics permit. This has been especially apparent in rural areas.

There are, in general, three main approaches for a public health program in maternal hygiene. First, by means of preconceptional conference and examination, certain groups of women may be sorted out for whom the hazards of pregnancy are excessive temporarily or permanently. Second, during the antenatal period, proper examination and care offer additional safeguards to the lives and health of mothers and their babies. Third, by making available suitable environment and adequately trained attendants at the time of delivery, another major group of catastrophes to both mother and infant may be prevented. I shall present more precisely some of the more important objectives of these three phases of maternal hygiene programs, and outline the roles which they have played in past activities, as well as the future trends to which past experiences seem to be pointing.

A. Preconceptional Care.—By preconceptional examination, it is possible to sort out several small groups of women in which mortality and morbidity are excessive to the mother, or to the baby, or to both. For one small group of women who suffer from severe forms of chronic organic disease, principally heart disease, vascular hypertension and parenchymatous nephritis, the hazards of pregnancy are permanently excessive. For another larger group with less severe conditions, such as compensated heart disease, mild hypertension, and diabetes mellitus, the risks of pregnancy may be greatly minimized by preparing for pregnancy and planning a regime of meticulous medical supervision and rest during the antenatal period. For a third group, the risks of pregnancy are excessive until such conditions as obesity, anemia, nutritional deficiencies, syphilis, tuberculosis, and foci of infection are adequately treated or corrected. Finally, there is another small group of women from whose family histories and past obstetric histories, it may be determined that the prospect for a live and healthy baby is poor. Thus, women who have had deformed babies, especially deformities of the central nervous system, such as anencephaly, hydrocephalus, and spina bifida are more likely subsequently to produce defective offspring than women without such histories.[24] The likelihood of the recurrence of erythroblastosis fetalis in subsequent pregnancies is great. Among the heritable diseases may be mentioned hemophilia, congenital cerebral degeneration, amaurotic family idiocy, idiopathic osteopsathyrosis (fragilitas ossium), congenital optic atrophy, Huntington's chorea, and certain types of feeble-mindedness.

The implications from these statements are reasonably clear. Women for whom the risk is excessive should not undertake pregnancy. The obese, syphilitic, tuberculous, anemic, or malnourished woman should be treated and the condition corrected before pregnancy. The mild cardiac, hypertensive, or diabetic woman should first be informed of the added risk of pregnancy. If she chooses to run this added risk to her life, she should prepare economically and otherwise for the rigid regime of medical supervision and rest during the prenatal period which alone will minimize that risk.

From studies of maternal and fetal morbidity and mortality, it may be shown that a surprisingly large percentage of stillbirths, premature babies, neonatal deaths, and maternal deaths occur among these women,

and that heeded preconceptional advice might have avoided disaster in the majority of cases which fall into these groups. Thus, Cosgrove in a study of the last one hundred maternal deaths at the Margaret Hague Maternity Hospital, found that 40 per cent were attributable to disease antecedent to, or independent of, pregnancy. Prior to 1921 when a clinic was organized to meet this problem among women with heart disease,[25] nearly 25 per cent of all maternal deaths at the Boston Lying-in Hospital occurred in patients with organic heart disease. The gross fetal loss in a series of 598 pregnancies among cardiac cases was over 20 per cent.[26] Matthews and Der Brucke[27] have recently shown that maternal and fetal morbidity and mortality are increased many times in patients who weigh over 200 pounds. The writer[28] has shown that both the incidence and mortality of eclampsia are increased in patients with antecedent hypertensive disease or nephritis.

In the study of 2,041 consecutive maternal deaths by the New York Committee,[29] 344, or 16.8 per cent, were classified as due to diseases antecedent to, or independent of, pregnancy. This estimate is undoubtedly too low, for such conditions as obesity, malnutrition, anemia, focal infections, vascular and renal disease which are very important factors in deaths from dystocia, shock and hemorrhage, and toxemia were certainly underestimated. The results of like studies are similar in other communities (Boston,[30] Philadelphia,[31] South Carolina[32]). Indeed, if one were to choose between preconceptional examination and advice and prenatal care, it is highly probable that the former would exert the greater influence for the better in both maternal and fetal morbidity and mortality.

Little has as yet been accomplished in this potential field in maternal hygiene programs. Preconceptional clinics and consultations are associated in the minds of most lay people primarily with contraception for purely social reasons and the treatment of sterility. The urgency of educational work along these lines is indicated by the fact that antecedent disease is the chief or an important contributory cause in a considerable proportion of all maternal deaths.

There are probably two principal reasons why preconceptional care has not received the attention which it appears to deserve. First, the relative frequency and importance of antecedent diseases as principal or contributory factors in maternal and fetal deaths has not been generally appreciated. Second, due to the fact that an effective program in preconceptional care involves prevention of pregnancy in one way or another, differences in social and religious opinion with reference to the use of contraceptives have resulted in hesitancy to attack the problem. Even in groups which have come to appreciate its importance, there has been a tendency to avoid the issue. Thus, in the report "Maternal Mortality in Boston," page 24, we find this statement: "As long as women suffering from nephritis or severe cardiac or other organic diseases become pregnant, there will be deaths occurring in this group. Even when therapeutic abortions are done, some deaths may occur. The management of these cases brings up debatable points which we do not care to enter upon. The medical profession should not, however, be blamed for these deaths." If we do not care to enter into these medical questions, why should we not be "blamed"?

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The New York Committee also was impressed by the influence of extrapuerperal disease in the series of deaths which they studied. On page 107 ("Maternal Mortality in New York City"), they state: "When all the

deaths from strictly puerperal conditions had been considered, there remained a large group of deaths of which the actual cause was a condition not directly connected with the puerperal state, but one which was exacerbated by the pregnancy and delivery." Their discussion does not beg the question quite so markedly as the Boston report, although in some ten pages of conclusions and recommendations (pp. 213-222), there is no mention of preconceptional examination or preconceptional advice.

In the report of the Committee on Maternal Welfare of South Carolina, based upon a study of maternal deaths during 1934-1935, so-called extrapuerperal deaths were simply listed and then excluded from the study, although in a considerable number of the cases excluded, death from cardiac, vascular or renal disease was undoubtedly precipitated by pregnancy. It is one thing to adjust a maternal mortality rate by excluding deaths precipitated by pregnancy in patients with extrapuerperal disease. However, this does not diminish the greatly increased risk of pregnancy to such women and their babies. The logical measures to prevent such catastrophes are preconceptional examination combined with suitable advice and treatment.

The American Birth Control League has made contraceptive advice available to many patients who were fortunate enough to have had preconceptional examination and to have been advised by their physicians to avoid pregnancy. In a recent communication,[33] the introduction of a state-wide birth control project has been described in which the necessary supplies are to be provided by the state department of public assistance. It is stated that this plan has the approval of the state medical society. Much emphasis has been placed on economic considerations and eugenics by the League with advocacy of birth spacing for social and economic reasons. It would appear that insufficient emphasis has been placed upon the importance of medical preconceptional examination in leading to the detection of temporary or permanent medical hazards to pregnancy and to the provision of contraceptive information for those patients in whom the condition cannot be corrected. Organizations interested in making contraception available to women are adopting the viewpoint that the contraceptive clinic should also provide medical preconceptional examination and advice.

In summary, preconceptional care is a hitherto conspicuously neglected field in the maternal hygiene program which offers great promise of rewards in terms of lowered maternal and fetal morbidity and mortality. Due to the social and religious issues involved, most of the progress which has been made has come through individual effort and nonpolitical groups.

B. Prenatal Care.—By means of adequate prenatal care, it is possible directly or indirectly to prevent certain types of maternal deaths, stillbirths, and neonatal deaths. Proper control of nutrition and hygiene are factors in reducing the incidence of pregnancy toxemias with some reduction in stillbirths and neonatal deaths in premature babies. Maternal nutrition undoubtedly also plays a part in determining the adequacy and subsequent health of the infant. Prevention of excessive weight gain during pregnancy is an important factor in reducing the incidence of unsatisfactory labors and malpresentations, both of which often terminate in difficult operative deliveries which are hazardous to mother and baby alike. Matthews and Der Brucke, in a review of 200 pregnancies among women who weighed over 200 pounds, found the combined still-

birth and neonatal mortality to be 12 per cent, approximately three times the usual rate. While there is a measurably increased risk to life associated with pregnancy and delivery in the obese, the importance of proper nutrition during pregnancy and lactation to optimal maternal and infant health has not been so fully appreciated.

The havoc which untreated maternal syphilis plays with the fetus in terms of late abortion, premature birth of syphilitic infants, and stillbirths is generally known. The treatment of maternal syphilis which antedates pregnancy should begin before conception and should continue through pregnancy. Infections acquired during pregnancy or first diagnosed at prenatal examination may be treated during pregnancy with brilliant results from the standpoint of the infant, as has been shown consistently in a number of recent studies. Thus, McCord,[34] in a study of 2,150 women with positive Wassermann reactions during pregnancy, found that of 1,013 pregnancies in which no treatment was given, 49.4 per cent of the infants were nonviable, stillborn, or died in the neonatal period. However, among 298 patients who had received ten or more treatments during pregnancy, the fetal loss was only 5.4 per cent. If suitable treatment of maternal syphilis is begun before the fifth month of pregnancy and continued throughout pregnancy, the prospect of obtaining a syphilis-free infant is considerably greater than 90 per cent. Further, adequate treatment from the standpoint of the baby is well tolerated by the mother during pregnancy. Indeed, as a result of his studies among syphilitic mothers, McCord was led to the following conclusion: "There seems to be no condition in medicine that returns such huge dividends in life and health with such a small output of energy and money as that seen in the prevention of congenital syphilis." This enthusiasm for the results of treatment is shared by others.

Recently, objections to the terms "hereditary" and "congenital" as applied to syphilis of the newborn have been re-emphasized, and the descriptive term "prenatal syphilis" proposed.

In a number of recent reports from large clinics upon the relative frequencies of causes of death in the neonatal period, one is somewhat surprised at the low incidence of syphilis. Thus, in a review of neonatal mortality at the Boston Lying-in Hospital based upon 120,726 consecutive deliveries, Clifford[35] reports a neonatal death rate from syphilis of 0.52 per 1,000 births. During the past ten years, involving 31,786 deliveries, the rate was only 0.16. Cruickshank,[36] in a study based upon 800 post-mortem examinations, found syphilis as an established cause of neonatal death in only 0.75 per cent of the cases. Swanson, Turner, and Adair[37] reported only one neonatal death from syphilis among 10,000 births. Several factors may be operative in explaining the low incidence of syphilis in these reported cases. First, in many large obstetric institutions such as those cited, most of the patients have received prenatal care, including treatment of maternal syphilis. Second, the incidence of maternal syphilis is considerably lower among the patients of these hospitals than in many other areas. McCord, in Atlanta, was able to find 2,150 colored women with strongly positive Wassermann reactions during pregnancy. Among these women, pregnancy ended in disaster for the baby in 29.4 per cent. More than half of them received no treatment, and among this group 49.4 per cent of the babies were lost through abortion, stillbirth, or neonatal death. Third, most syphilitic babies which are not stillborn, do not succumb during the neonatal period but live

on for months or years to succumb to infection, nutritional disturbances, or to form a significant group in our mentally or physically handicapped population.

The advantages of adequate treatment of maternal syphilis are so clear that there is general accord that routine use of the blood Wassermann reaction should be made during pregnancy. At least, there is general accord that the initial prenatal examination should include a blood Wassermann test. Enthusiastic syphilologists have recommended the repetition of the test one or more times as pregnancy advances to pick up infections acquired during the course of pregnancy.

Progress has been made in the recognition and treatment of maternal syphilis which is showing results in terms of fewer stillbirths and neonatal deaths from syphilis. The blood Wassermann reaction is done as a routine in most prenatal clinics at the first examination. In many rural areas without clinics, the taking of blood for the Wassermann reaction is part of the routine of the public health nurse on her first prenatal visit.

Recently, in several states, legislation has been introduced and passed which requires that the Wassermann reaction be determined for both partners before a marriage certificate be issued. Objections have been offered to such legislation on the ground that the Wassermann reaction is a laboratory procedure which is subject to error. However, there would seem to be much to be gained by the adoption of this routine measure in conjunction with routine premarital medical examination.*

In the state of New York, an act has just been passed which requires the performance of a standard serologic test for syphilis during pregnancy as a part of prenatal care. The act also provides that those filing birth or stillbirth certificates shall state on the certificate whether such test was made upon the mother's blood during pregnancy and, if so, when. If no test has been performed, the reason why it has been omitted must be stated. However, the act has been somewhat emasculated in that "In no event shall the birth certificate state the result of the test." The adoption of such a practice should provide valuable information, but at present it would appear that enforcement of any such measure will be difficult or impossible.

The early recognition of the pregnancy toxemias involves the determination of the blood pressure, examination of the urine for albumin and weighing the patient every three or four weeks in early pregnancy and at intervals not greater than two weeks during the last trimester. The advantage of suitable prenatal care from the standpoint of the prevention of eclampsia is well recognized. However, what proper care may accomplish in the reduction of deaths from stillbirth and prematurity in babies of toxemic mothers has not been sufficiently appreciated.

Routine blood pressure and urine examination at prenatal examination have become well established in prenatal clinics. The value of rapid gain in weight as an early sign of pre-eclampsia is becoming generally appreciated. In some rural areas the public health nurses are weighing patients at prenatal home visits upon portable scales which they provide.

*Since this was written, legislation has been passed in the state of New York which requires that in order to obtain a marriage license, each applicant must submit a statement from a licensed physician that he has submitted to an examination for syphilis within the previous twenty days, and that in the opinion of the physician, the person named is not infected, or is not in a stage in which the disease may become communicable. The physician's report must be accompanied by a report from an acceptable laboratory of a serologic test for syphilis.

Indirectly, through proper instruction at prenatal visits, tragedies from antepartum hemorrhage may be reduced. The ultimate outcome in these cases depends upon how early they are seen, and the judgment and skill with which they are treated. Prenatal care will not prevent placenta previa, nor will it prevent death from shock, hemorrhage, or sepsis which result from improper treatment of this condition. However, it is possible at prenatal interviews to impress upon the patient the importance of immediate reporting of any vaginal bleeding in the latter half of pregnancy, so that timely treatment may frequently save both mother and baby.

Prenatal instruction of patients in certain matters will aid in the reduction of the incidence of premature delivery. Factors which are known to be associated with prematurity (in addition to the pregnancy toxemias and antepartum hemorrhage), are overwork, inadequate rest, improperly managed acute respiratory infections, endocervicitis, and premature rupture of the membranes. The occurrence of local vaginal trauma, such as from vaginal douching and intercourse in the last trimester of pregnancy, is definitely associated with premature rupture of the membranes and the onset of premature labor in a considerable number of patients.

Finally, pelvic mensuration prior to the onset of labor should prepare the accoucheur for early recognition of dystocia due to cephalopelvic disproportion. By means of such examinations, certain patients may be detected in whom the prospect for pelvic delivery of a live baby is hopeless because of severely contracted pelves. These women and their babies may be spared the added risk of prolonged and futile tests of labor. It should be pointed out, however, that evaluation of the pelvic measurements in the hands of the relatively inexperienced has resulted in condemning many women needlessly to cesarean section. Even in experienced hands, the prognosis for pelvic delivery in a large group of patients with so-called borderline pelvic contractures must await a reasonable test of labor. Thus, in the hands of the inexperienced and of enthusiastic operators, the detection of minor degrees of pelvic contracture has resulted in many pointless cesarean sections. Recently, the development of improved methods for roentgenographic study of the pelvis offers prospect of a more accurate prognosis for pelvic delivery. Opportunity to reduce the incidence of breech deliveries by external version at prenatal examinations has already been mentioned.

In general, most public health programs in maternal hygiene in the past have been concerned largely or entirely with prenatal care. It may be seen from study of the causes of maternal and fetal catastrophes that prenatal care alone has decided limitations. Although it is the principal weapon in combating the ravages of toxemia and syphilis during pregnancy, it plays a decidedly secondary role or no part in a greater number of other conditions which can be approached only through preconceptional care on the one hand, and proper environment and adequately trained personnel at the time of delivery on the other. Prenatal care can accomplish little about the estimated 8,000 maternal deaths, most of which it is estimated[38] result from induced abortion each year. These women either should not become pregnant, or else the social and economic factors which have made pregnancy undesirable should be altered. Prenatal care can have little direct influence upon deaths from

puerperal sepsis which is introduced at the time of delivery, nor upon maternal and fetal deaths and injuries from ill-advised, untimely, or unskillful delivery.

Too much has been expected of prenatal care per se, and the recent trend has been toward the recognition of its limitations in a maternal hygiene program when it is not integrated with preconceptional and delivery services. The present trend is to the cautious development of varying types of delivery services to be integrated with existing prenatal service.

C. Delivery Care.—At present, probably the largest single group of preventable maternal deaths result from circumstances attending the conduct of labor and delivery. Similarly, the majority of preventable stillbirth and neonatal deaths result from asphyxia, intracranial hemorrhage, and other injuries to the infant which arise during the course of labor or delivery. Even in the case of premature labor, much of which is at present unpreventable, reduction in neonatal mortality will be largely dependent upon the management of labor, delivery, and the neonatal infant.

The influences of premature and unskillful operative delivery, as well as the use of contraindicated, ill-chosen, or improperly administered analgesics and anesthetics, have already been discussed. The importance of special precaution with reference to the use of analgesic drugs and the prevention of asphyxia and intracranial trauma in the delivery of premature babies has also been emphasized. The chief problems with which we are concerned in the improvement of delivery care in the maternal hygiene program as a phase of public health service are:

1. The relative merits of home and institutional delivery.
2. The provision of adequate equipment at delivery.
3. The provision of suitable training for the accoucheur, which includes (a) improved undergraduate training in obstetrics, (b) provision of more facilities for postgraduate training in obstetrics, (c) provision of regional refresher courses in obstetrics for the general practitioner, (d) the training, supervision and control of midwives, (e) provision of consultants when needed.
4. The provision of a delivery nursing service to assist physicians at delivery and to provide postpartum care in the home.
5. The provision of facilities for the proper care in homes or institutions of premature babies.

As regards the relative advantages of home versus institutional delivery, recent statistics from the Massachusetts State Department of Health indicate that the safest place in which to deliver a baby is in a well-equipped maternity hospital.

Of course, factors other than the place of delivery inevitably come into such statistics; for example, the great majority of patients delivered in maternity hospitals are under the care of physicians more highly trained in obstetrics. Further, whether or not the maternity hospital is the safest place to deliver a baby, practically some 60 per cent of women are delivered in their homes. Further, a majority of them, at least in rural areas, will continue of necessity to be delivered in their homes. Moreover, even in smaller urban sections, the provision of maternity hospitals as separate institutions from general hospitals is rarely possible.

The records of small general hospitals as a group are decidedly inferior to maternity hospitals or separated maternity units of large general hos-

TABLE II

MATERNAL AND FETAL MORTALITY IN MASSACHUSETTS, ACCORDING TO SITE OF CARE, 1934 AND 1935

	NUMBER				MORTALITY RATE		
	LIVE BIRTHS	STILL-BIRTHS	NEO-NATAL DEATHS	MA-TERNAL DEATHS	STILL-BIRTHS*	NEO-NATAL DEATHS*	MA-TERNAL DEATHS†
Maternity hospitals	9,873	253	219	29	25.0	21.6	2.9
General hospitals	74,697	2,353	2,074	376	30.5	26.9	5.0
Home deliveries	42,191	1,277	1,094	237	29.4	25.1	5.6
Total	126,761	3,883	3,387	642	29.7	25.9	5.1

*Rate per 1,000 total births.
†Rate per 1,000 live births.

pitals. In a number of states, movements are afoot to require minimum standards and equipment in all hospitals licensed to accept obstetric patients. It is important, especially in rural areas, that provision be made in small hospitals for the care of maternity cases unsuited to home delivery.

That delivery in the home can be made safe for the great majority of women is indicated by the results obtained at the Chicago Maternity Center.[39] During the years 1932-1936, this organization has cared for 12,597 patients in their homes with only 18 maternal deaths, a gross maternal mortality rate of 1.4 per 1,000 live births. This figure includes all patients cared for, even though ultimately referred to a hospital for complicated delivery. The patients were not selected, the only prerequisite for care being poverty. To be sure, this service is directed by expertly trained obstetric talent, and the equipment which is taken into the home "might well be termed a traveling hospital." Nevertheless, it is a teaching institution for physicians, medical students, and nurses, and most of the work is done under supervision by these men and women.

It is of interest that 556, or 4.4 per cent, of these women were hospitalized for some complication of pregnancy or delivery, and that 130, or 1.1 per cent, of the patients delivered in the home were subsequently transferred to hospitals. Thus, if this is a fair sample from which to judge, in order to provide safe facilities in rural areas for home delivery of women, there should be available suitably equipped hospital beds for some 5 per cent to 6 per cent of them.

Another point which may be learned from the experience of the Chicago Maternity Center is that the services of a well-trained obstetrician as a readily available consultant are indispensable for the best results.

There are other examples of splendid records in large series of home deliveries with much less elaborate organization, staff, and equipment. Thus, under supervision of physician inspectors in Philadelphia, midwives attended 91,074 births with 77 maternal deaths, a maternal mortality of 0.85 per 1,000 live births.[40] In a report by Irving[41] for the ten years 1926-1935 for the out-patient service of the Boston Lying-in Hospital, Harvard Medical School students with very simple equipment and without the routine assistance of a nurse have delivered 11,330 babies in homes with only 4 deaths, a maternal mortality rate of 0.35 per 1,000 live births. As he points out, only normal pregnant women are

delivered in their homes; except for simple low forceps and multiparous breech extractions, no operative deliveries are undertaken. It is clear from this and similar evidence that delivery may be safely accomplished in the home for the majority of women. It is equally clear that unless the services of an expert obstetrician and hospital facilities are available for from 5 per cent to 10 per cent of women in whom pregnancy or labor offers serious complication, such results cannot be obtained.

How to meet this situation in many rural areas where hospital facilities are not available is a problem now under investigation by those interested in maternal hygiene as a branch of public health service.

Local public health units in many areas have made available sterile delivery packages for the use of physicians conducting deliveries in the home. Such packages contain gown, gloves, towels, drapes, sponges, and cord ties. They may be obtained upon written request by the physician or the family at the local health department or at some convenient point. This measure has simplified and improved the technique of delivery in the home materially and has been long enough on trial to be reported upon favorably by local physicians.

The best of both undergraduate and graduate obstetrical training is available in the United States. The difficulty in the past has been that such training has not been available to all medical students and to all graduates who desire it. Recent progress has been made in improving undergraduate obstetric training. There are also facilities for the training of a reasonable number of specialist obstetricians. The greatest insufficiency in the past has lain in an inadequate number of short, practical graduate courses for physicans who propose to do obstetrics as a part of general medical practice. More recently, this situation has also received attention. Thus, at the Margaret Hague Maternity Hospital in Jersey City, for a number of years, short practical graduate courses in obstetrics have been available for a considerable number of physicians each year. The whole of the large clinical facilities of this institution is devoted to postgraduate teaching. The Chicago Maternity Center also offers opportunity for brief courses of practical postgraduate study. Numerous other teaching institutions now offer one- or two-month courses for postgraduate training in obstetrics. There is still more demand for such courses, especially where practical experience can be offered, than there are opportunities available, and efforts should be continued to develop teaching resources to meet this demand.

In addition to the current trend to extension of these formal courses in practical postgraduate obstetrics, most states have had or are planning "refresher" courses in obstetrics which are given locally to physicians. In many states, a number of local obstetricians have given lectures arranged through the cooperation of the state health department and the local medical societies. In others, a teacher of obstetrics has been invited to come in and give a series of lectures at various strategic points over the state. A recent scheme which has been in operation for two years in Tennessee has met with much local approval. Through the combined auspices of the state medical society, the state department of health, the University of Tennessee College of Medicine, Vanderbilt University, and the Commonwealth Fund, a teacher of obstetrics has been employed on a full-time basis to give a refresher course at points available to physicians throughout the state. A nominal charge has been made for the course of lectures which have been very well attended.

In addition to the lectures, the teacher sees patients in consultation with the practitioners on request. This scheme seems to have worked out particularly well.

As a general project, the difficulty presents itself that men who are properly qualified and desirable as teachers seldom desire to continue in such work indefinitely. It would seem feasible to develop a plan in which young men from teaching clinics who contemplate careers as teachers might do this work for one or two years after considerable clinical training. Such a scheme would keep the "refresher" courses up to date, and at the same time would provide future teachers with first hand knowledge of conditions under which obstetrics must be practiced over the country. Such experience would appear highly desirable as a background for teachers of obstetrics.

There is opportunity for much experimental work to determine the most satisfactory method of providing these "refresher" courses. Although the system on trial in Tennessee involves considerable expense, it deserves further attention. There can be no doubt that such teaching is usually more successfully done when it is on a full-time basis.

The training and control of midwives is a problem of greatest concern in the South, for it is principally in this region that midwives will continue to deliver a large proportion of women far in the future. Unfortunately, there is practically no provision for the formal training of midwives in the country. The Lobenstein Clinic in New York City offers an excellent course in midwifery for a few graduate nurses, but opportunities for study are limited to women who are being trained primarily for supervisory work. Schools to train colored midwives for rural work in the South are needed.

The provision of a nursing service to assist the physician in home deliveries is a very helpful measure in a maternal hygiene service. In a few districts, such assistance has been available to physicians through local nonpolitical social and nursing agencies for over ten years. The last few years have seen a great increase in the number of such services. In most of them, the physician may obtain the assistance of a trained delivery nurse upon request. It has been available free to patients unable to pay, and the usual practice has been to arrange a sliding scale of fees for patients in better economic circumstances. In a recently obtained report from the National Organization for Public Health Nursing, the administrative details of thirty such agencies have been described.[42]

County and local official health agencies in the past have been hesitant to offer delivery nursing service as a part of the official maternal hygiene program largely because of the expense involved. The cost has been kept down by nonpolitical agencies through their systems of fees based upon the ability of the family to pay. It would be inadvisable or impossible to charge for service offered through an official health agency. However, the value of the delivery nurse has become so generally appreciated by physicians, patients, and health administrators alike that it has been introduced during the past few years in a number of rural county health units as part of the maternal hygiene program. Information as to the cost should be available within the next year or two.

Attention has been focused recently upon the immediate postnatal care of premature babies as a community and public health problem. This must be considered a part of the maternal hygiene program be-

cause the immediate management of the newborn infant is in most instances in the hands of the physician who has delivered the child and because the procedures which give promise of reducing the mortality among premature infants must be applied promptly if they are to be most effective. It is accepted as the responsibility of the physician who provides obstetric care to provide or to secure prompt and adequate care for the premature infant. To insure that such action is regularly taken, the community must not only see to it that adequate facilities are available, but that these facilities are promptly taken advantage of in appropriate instances.

In Chicago a special program has been in progress for several years which involves training of physicians and nurses in the proper care of the premature baby, prompt reporting of premature births, suitable provision for safe transfer of such babies to hospitals, and proper hospital equipment for their care.

A special commission appointed by the governor of Massachusetts to "Study and Investigate Public Health Laws and Policies" recommended in its report issued in 1936 that:

"1. All births of infants weighing under five pounds be reported immediately by telephone to the board of health.

"2. Boards of health be required, upon request of the attending physician and family, to provide suitable transportation of such infants born in the home to a properly equipped near-by hospital.

"3. Boards of public welfare be obliged to pay for care of such infants if the parents are unable to pay, such aid to be given without pauperization of the family."

An act of the legislature converted these recommendations into law in the following year. As a result, a state-wide program for improving the care of premature babies has been undertaken by the Massachusetts Department of Health. A group of hospitals, strategically located throughout the state, have been encouraged to acquire suitable equipment for transportation and care of the premature baby. Special training in their care has also been provided for nurse supervisors for each of these district hospitals.

There has been growing appreciation of these problems in maternal health both by physicians and laity. On the one hand, both physicians and the public are becoming cognizant of what constitutes adequate maternal care in terms of preconceptional, prenatal, and delivery service. On the other hand, survey of the facilities available under existing conditions demonstrates that they are inadequate to provide acceptable care for a large proportion of women. It has been estimated that annually some 840,000 births, or more than one-third of all births, occur in families which are on relief or have total incomes (including home produce) of less than $750 per year. Of these, approximately 650,000 occur in rural areas and cities of less than 50,000 population. There is simply not enough money in these families to pay private physicians for adequate obstetric care.

Some indication of the trend of public opinion as to what should be done about this situation may be obtained from the results of a survey reported by the American Institute of Public Opinion in November, 1937. The question asked was: "Should the Federal Government aid

state and local governments in providing medical care for mothers at childbirth?'' Eighty-one per cent of the persons who replied answered ''yes.''

At the Conference on Better Care for Mothers and Babies, held at the invitation of the Children's Bureau in January, 1938, and attended by representatives of leading health, medical, nursing, civic, farm, labor and religious organizations, one outstanding feature was the shift of emphasis from child health to maternal health. The trend of opinion expressed at the Conference may be obtained from the report of the Committee on Findings.[43] Under ''Opportunities for Saving Life,'' in addition to the usual stress placed upon prenatal care, emphasis was placed upon the values of preconceptional and premarital care, on one hand, and upon the provision of both medical and nursing attendants at delivery and in the puerperium on the other. The importance of consultation service and the provision of facilities for adequate hospital care in difficult cases was emphasized.

Under ''Plan of Action'' the ends to be sought were outlined as follows:

''The Committee finds that preserving the lives and health of mothers and babies is of such importance to all the people that it warrants immediate and concerted national consideration and national action.

''*The principal objectives to be sought are the following:*

''Full opportunity for practical instruction in obstetrics and the care of the newborn infant—

''For undergraduate students in medical schools, for physicians resident in hospitals, and periodically for practicing physicians in postgraduate courses.

''For the student nurse and at recurrent intervals for the graduate nurse or the public health nurse whose work includes maternity nursing in private practice or in public health service.

''Supervision of the mother throughout pregnancy by a qualified local physician aided by a public health nurse, preferably one with recent training in obstetrics and care of newborn infants.

''Care at delivery by the same qualified local physician, aided by a nurse trained and experienced in delivery nursing care, such care to be given in the home or in an approved hospital provided with adequate obstetric and pediatric services and facilities for caring for emergency or complicated cases.

''Postpartum and postnatal medical and nursing supervision in the hospital and the home.

''Consultation service by obstetricians and pediatricians to aid general practitioners in their care of mothers and infants.

''Community provision for care by a qualified physician and nurse, for consultation service, and for hospital care when indicated, including transportation to the hospital, for the mother or baby to whom such care is otherwise inaccessible or who cannot obtain care unaided.

''*Further progress toward these objectives* can be made through concerted effort of all concerned with maternal and infant care as follows:

''By increasing professional resources through—

Better *undergraduate* education and training . . .

Better *graduate* educational facilities for nurses and physicians; . . .

Better distribution of competent physicians;

More specially trained graduate public health nurses; . . .

"By developing in both cities and rural areas complete service for mothers and newborn infants through the utilization of available competent service under both public and private auspices, of extension and improvement of public services not adequate to meet the need—

The local community to provide maternal and infant care as needed, as part of its public health responsibility;

The state to give leadership, financial assistance, specialized service, and supervision in the development of local services;

The federal government to assist the states through financial support, research, and consultant services.

"*The committee finds that if this plan of action is to be carried out, federal participation would be necessary as follows:*

"Amendment to Title V, section 502, of the Social Security Act to authorize a larger sum to be appropriated annually to the states for maternal and child health services with provision that the increased payments to the states should be used for the improvement of maternal care and care of newborn infants.

"The authorization should provide for gradual development of the program, in both its educational and its administrative aspects, and for necessary increases in appropriation until a sum is reached that will insure care for all women who are unable to obtain care otherwise, either because of economic reasons or because of inaccessibility of care in the communities in which they live.

"*The extent to which this plan can be made a reality* depends upon the desire of the public to be adequately served, the leadership of the professional groups in the provision of service of high quality, and the development by public agencies, in cooperation with private agencies and individuals, of a program of education and medical nursing care which will meet the needs of the various groups in the population. . . ."

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SEVENTH ANNUAL MEETING OF THE AMERICAN ACADEMY OF PEDIATRICS

NEW YORK, N. Y., JUNE 4 AND 5, 1937

Round Table Conference on Common Skin Diseases

Chairman: Dr. A. B. Cannon, New York, N. Y.
Assistants: Dr. J. L. Miller, New York, N. Y.
Dr. Gerald F. Machacek, Long Island, N. Y.
Miss Hazel Bishop, Mycologist, New York, N. Y.

CHAIRMAN CANNON.—To add interest to this round table discussion of the commoner skin diseases met with in infancy and early childhood, I have asked my colleagues Dr. Miller and Dr. Machacek, and our laboratory technician, Miss Bishop, to join me in the discussion. We do not only welcome, but urge each member of the group present to participate in a free exchange of ideas; by this method we shall all gain something of value.

Fungous Diseases

Tinea Circinata

CHAIRMAN CANNON.—This is the familiar form of ringworm, seen in children. It occurs as scaly patches, usually more or less circular and characterized by central clearing and peripheral vesiculation and crusting. It may vary in severity, at times becoming pustular and infiltrated.

Will you discuss the treatment, Dr. Miller?

DR. MILLER.—An excellent remedy is 2 per cent alcoholic gentian violet, which has the advantage of being a good fungicide without causing irritation of the skin. Its disadvantage is an objectionable, purplish staining. In open lesions, aqueous 2 per cent gentian violet may be used to prevent initial stinging.

Other remedies are 3 per cent iodine (not as likely to burn as full strength tincture of iodine); 10 per cent ammoniated mercury or 4 per cent sulfur in Lassar's paste.

DR. JEROME KOHN (N. Y.).—How about iodine in oil—does that burn?

CHAIRMAN CANNON.—No, that is fine. We have an excellent preparation in iocamfen.

Tinea Capitas

CHAIRMAN CANNON.—This is a fungous infection of the scalp which is recognized by one or more circular areas of erythema crusts or follicular pustules. When caused by the fungus microsporon (the usual cause in this country), the hairs are broken off just above the surface of the scalp. This is a rather characteristic finding and serves to differentiate this condition from alopecia areata when the alopecia is complete with no signs of redness, crusting, etc. Occasionally a more marked infection is present with inflammatory swellings made up of small abscesses. This type is referred to as tinea kerion.

Dr. Machacek, would you discuss the treatment of this condition?

DR. MACHACEK.—For younger children, particularly as a public health measure, x-ray epilation is probably the most efficient and in certain infections such as favus, indispensable. For older children manual epilation may be sufficient. In any event local antiparasitic agents must be used, such as, sulfur ointment, iodine, chrysarobin, oleate of mercury, oil of cade and salicylic acid. When using x-ray epilation must be completed by application of a plaster cap. Tinea capitis complicated by kerion usually does not require epilation and has a better prognosis.

CHAIRMAN CANNON.—Will you tell us, Dr. Miller, how to epilate the scalp?

DR. MILLER.—First, the scalp is thoroughly washed, then shaved. No strong ointment should be used on scalp for at least two weeks previous to x-ray treatment. One unit of unfiltered x-ray is given to each of five areas (care being used to prevent overlapping) thus covering entire scalp. About seventeen days later an adhesive cap is left on scalp overnight and removed next morning. All hairs will be removed painlessly. Then daily washing and antiparasitics should be used to prevent recurrence.

Another method of epilation is with thallium acetate; 7 milligrams per kilogram of body weight is given in a single dose by mouth.

DR. MACHACEK.—In relation to thallium acetate it must be mentioned that child must be weighed accurately because this drug is fraught with danger.

CHAIRMAN CANNON.—X-ray or thallium acetate epilation should not be done unless absolutely necessary. We practically never have to epilate in private practice. First, the hair is clipped, then thoroughly washed with tincture of green soap, hot compresses of boric acid and soda bicarbonate, 5 to 6 per cent salicylic acid in olive oil, and manual epilation of infected hairs will give success if continued long enough.

DR. J. H. MARKUS (NEW YORK, N. Y.).—Have you had any experience in using merthiolate?

CHAIRMAN CANNON.—No, we haven't. Will you tell us your experience?

DR. MARKUS.—We paint the tincture on the lesions several times daily.

Tinea Favosa

CHAIRMAN CANNON.—Favus, caused by the *Achorion schönleinii*, is distinguished by forming scutula, which are cup-shaped crusts pierced by a hair. This disease is found mainly in Russian, Polish, or Italian immigrants. It results in permanent alopecia in involved areas.

Tinea of Hands and Feet (Dermatophytosis)

CHAIRMAN CANNON.—This is a very common form of skin disease. In its simplest form, it forms the macerated skin between the toes familiar to all. In more resistant forms, it shows the pinhead, deep-seated, bluish vesicles generally present on the palms and soles. These lesions may become secondarily infected with lymphangitis spreading up the leg. The infection of the nail with fungus is a point often overlooked, and is responsible for many of the recurrences. Involved nails can be diagnosed by the grooved, discolored, lustreless appearance of the nail, the resultant malformation, the accumulation of detritus beneath, and the quite characteristic chronic paronychia which are often present. These nails must be treated if you do not want recurrences.

The nail should be trimmed back to the healthy part, all detritus cleaned out, and Whitfield's ointment applied at night and liquid iocamfen in the morning. Excess iocamfen is removed by dusting boric acid powder over toes. This also tends to keep the toes dry during day.

DR. F. P. GENGENBACH (DENVER, COLO.).—Will you tell us who manufactures this iocamfen?

CHAIRMAN CANNON.—Schering and Glatz. Dr. Machacek, would you discuss the differential diagnosis of tinea of the hands and feet?

DR. MACHACEK.—The ultimate diagnosis of tinea of the hands and feet depends upon the demonstration of the fungi in scrapings or culture from these locations. Tinea of course, is more likely to be localized to the regions between the toes, but may readily be confused with eczema or dermatitis venenata. There may of course be secondary eczematization and secondary pyogenic infection which makes the differentiation on clinical grounds alone extremely difficult.

DR. H. S. STERN (RICHMOND, VA.).—May I ask what you do for fungoid infection of the feet, commonly known as athlete's foot?

CHAIRMAN CANNON.—We look for foci of infection about nails. Shoes should be changed once a week. White cotton socks, boiled every day, should be worn under regular socks. Dust boric acid powder into shoes when not wearing them. Use Whitfield's ointment at night and liquid iocamfen in the morning. Wash feet with liquid synol soap. In more marked cases, soak feet in hot boric acid or Burow's solution, diluted 1:8. Or you may use 2 per cent gentian violet.

MISS BISHOP.—Whenever possible it is desirable to back up clinical diagnosis with laboratory proof. The technique of finding fungus directly in the tissue by microscopic observation and even of culturing it is not difficult. The skin is washed with alcohol, and the scales around the suspected lesion or the heads of unopened vesicles are removed. Part of them are put on a slide for direct microscopic observation and the rest in a Petri dish containing Sabouraud's medium. A drop or two of 10 per cent sodium hydroxide is added to the scales on the slide and the whole covered with a cover glass. The slide is heated slightly to accelerate the deteriorating effect of alkali on normal tissue, fungus remaining untouched. Examination of the tissue under both low and high power will reveal the fungus as a thin, definitely walled, sometimes greenish-looking threadlike hypha or mycelium. In the case of the dermatophyte generally only the mycelium is found; in the case of monilial infection, both spores and mycelium or just spores alone, and in hair strands, predominantly the spores. The purpose of culturing a specimen which has been found positive in direct examination is to determine the causative organism by which prognosis and treatment are influenced.

The dermatophytes may be subdivided into two large classes, those which produce lesions of the scalp and those which produce lesions of the smooth skin. With Sabouraud's system of differentiation, the scalp lesions may be divided into two classes:

I. With scutula-producing favus, which is rare in this country

II. Without scutula

A. without suppuration

1. microsporon infections, highly contagious, hairs broken off a few millimeters from scalp
2. trichophyton endothrix, not so contagious, hairs broken off flush with skin.

B. with suppuration

1. trichophyton ectothrix.

The smooth skin lesions are the eczema-like type frequently due to epidermophyton and the rest generally due to trichophyton and occasionally to microsporon. A demonstration of all the common fungus cultures was given.

Pyogenic Diseases

Impetigo Contagiosa

CHAIRMAN CANNON.—Impetigo is caused by the staphylococcus or streptococcus and is one of the most common skin diseases seen by the pediatrician. As is well known, it begins as a vesicle which rapidly becomes pustular, forming yellowish crusts. On removal a smooth, red, moist surface remains which rapidly becomes covered with drops of exudate. This condition is highly infectious and seems to be spread around bathing beaches particularly. It is spread by direct contact, but in the majority of cases by contact with toys, towels, and pets.

Treatment of impetigo requires special care to prevent spread and to clear up the last vestige of the disease. We use hot compresses of soda bicarbonate and boric acid applied for fifteen minutes several times a day. Following this, the crusts may be easily removed with a little olive oil. Lesions are kept covered with 10 per cent ammoniated mercury salve at all times. If this does not cure, use 4 per cent sulfur in Lassar's paste. Iodine, 3 per cent, may be painted on spots but should not be used with ammoniated mercury. Silver nitrate, 15 per cent, is also good but produces unnecessary blackish staining. Gentian violet (3 per cent, alcoholic) is good in cases of children who are very active and will not keep a salve on. Ultraviolet light is a good remedy.

DR. KOHN.—Do not some people take off these crusts with soap and water?

CHAIRMAN CANNON.—We use a piece of cotton saturated with equal parts of peroxide and synol soap and apply it to the crusted areas, letting it stay long enough to soften the crusts, which are then easily removed.

DR. WILLIAM LONDON (Perth Amboy, N. J.).—What is your experience with tincture of metaphen?

CHAIRMAN CANNON.—I have not used it for this purpose. Will you tell us your experience?

DR. LONDON.—It is not rubbed off and does not have the disadvantage of producing a reaction. It has given us good results.

CHAIRMAN CANNON.—We have seldom seen reactions from ammoniated mercury ointment, even when used in stronger proportions.

Impetigo of Newborn Infants

CHAIRMAN CANNON.—This is also referred to as pemphigus neonatorum. This is a bullous form of impetigo occurring in newborn infants which is highly infectious. The infant is always ill. We advocate a soap and water bath followed by olive oil as a good preventive routine.

DR. GENGENBACH.—Some hospitals have a routine procedure of using a 2 to 3 per cent ammoniated mercury ointment or antiseptic oil on all newborn infants. Do you approve of this procedure?

CHAIRMAN CANNON.—What about that, Dr. Machacek?

DR. MACHACEK.—In my estimation it is better to use a bland sterilized oil than medicated unctions for the prevention of impetigo in newborn infants. It has been my experience to treat several such patients who had definite signs of mercurial poisoning following the extensive application of ammoniated mercury. I have noted tremors and acute hemorrhagic nephritis with marked anemia in two instances.

CHAIRMAN CANNON.—It seems to me it would be better to use a simple boric acid solution wash or sodium bicarbonate wash to avoid irritation of skin. This might be preceded by a soap and water bath.

DR. L. A. VAN KLEECK (NASSAU, N. Y.).—Since an epidemic of impetigo at our hospital in Nassau, we have routinely applied 5-10 per cent ammoniated mercury ointment once to each infant. After this we apply autoclaved olive oil daily. With this routine we have had no more impetigo.

DR. W. D. LUDLUM (BROOKLYN, N. Y.) advocated medical asepsis just as is used in surgery, using sterile gloves, gowns, etc., in the handling of the newborn infant. He advised using a stronger preparation than 3 per cent ammoniated mercury ointment.

DR. A. BOYER (CINCINNATI, OHIO) commented on the fact that during the recent flood in the Ohio Valley many of the infants in the newborn infant wards were given no baths, and in no case did impetigo develop.

DR. S. P. WAINWRIGHT (BIRMINGHAM, ALA.).—Are there any complications of impetigo, such as osteomyelitis?

CHAIRMAN CANNON.—No.

DR. KOHN.—Of what value is staphylococcus toxoid in impetigo?

MISS BISHOP.—I think we have obtained some favorable results, but whether it is of more value than other types of vaccine I could not say.

Acne Vulgaris

DR. MILLER.—Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous follicles characterized by comedones, papules, pustules, cysts, and nodules. As you all know it occurs mainly about puberty on face, back, and chest. A very important thing is treatment of early acne, manifested only by comedones, especially about the nose. This is best treated by washing face with soap and water three times a day and applying lotio alba at night.

Dandruff is always present to a greater or less extent, and attention should be paid to keeping it under control. Any focus of infection should be cleaned up, as cure is sometimes impossible until a focus, such as a tonsil, is removed.

The most valuable single treatment of acne is x-ray, given in fractional doses, but we prefer to use other remedies as much as possible.

Alpine light once per week in doses severe enough to produce peeling is an excellent remedy. Autogenous vaccine made from pustules given in 1 c.c. doses once per week is good, and in pustular cases express comedones manually. Hot compresses of boric acid and soda bicarbonate several times a day are excellent.

The purpose of local treatment is twofold—cleanliness and drying and peeling of skin. We use:

1. Soap and water three times a day with a washcloth. Superfatted soap is a good soap for the purpose.
2. Lotio alba at night.

℞ *Lotio alba*

Zinc sulfate	ʒ ii
Potassium sulfuret	ʒ ii
Aqua rosae q.s.ad	ʒ viii

3. Lotio calamine in daytime

℞ *Lotion calamine*

Caramel (to color)	ʒ ss
Acid, boric	ʒ ii
Phenol	ʒ ss
Calamine	
Zinc oxide āā	℥ i
Glycerin	ʒ v
Aqua calcis	
Aqua rosae āā q.s.	℥ viii

4. The following peeling cream may be substituted for the lotio alba at night:

℞ Acid salicylic	8 x
Sulfur praecipitation	8 x
Ung. aqua rosae q.s.	℥ i

5. When face becomes too dry, alternate above ointment with following soothing cream:

℞ Aquafor	
Ung. aqua rosae āā	℥ i

DR. G. W. KUTSCHER, JR. (ASHEVILLE, N. C.).—Do you or do you not express the blackheads?

DR. MILLER.—We do.

DR. LONDON.—What is the best method of expressing the blackhead?

DR. MILLER.—We use a comedone extractor which works very well. It can be obtained from Tiemann in New York.

DR. GENGENBACH.—Will you say something about the treatment of dandruff?

DR. MILLER.—As a general rule, people do not wash their scalps as frequently as they should. Every scalp should be washed at least once a week, more frequently if dandruff is marked.

A good practice is to apply the peeling cream given above to scalp at least six hours before washing; then wash thoroughly with tar or castile soap and apply following tonic three times a week:

℞ *Sabouraud's Tonic*

Pilocarpini hydrochloride	0.25
Liquid aqua ammonia	4.00
Sp. etheris	
Sp. lavendulae āā	26.00
Alcohol (90 per cent) q.s. ad.	240.00

DR. MILLER.—Although we firmly believe acne to be due to endocrine imbalance, so far no glandular secretion has been found which will benefit the majority of cases. Because of the wide effects of glandular secretions on the body as a whole, we do not see their empiric use justified.

DR. KOHN.—What about the diet in treatment of acne?

DR. MILLER.—We believe the essential thing is to avoid excessive carbohydrates.

DR. MACHACEK.—The clinical expressions of acne are quite simple. The presence of comedones, papules, suppurative cysts, pustules, and scars usually with an oily skin and seborrhea capitis is common. One must, however, consider the relation of this condition to local applications of hydrocarbon products or cod liver oil

and the ingestion of bromides and iodides. Occasionally disseminated tuberculides may simulate acne vulgaris, though the absence of comedones and true pustules helps in the differentiation. Ultimately the diagnosis of these relatively rare conditions depends upon microscopic examination of sections of the lesion. Miliary osteomas have on occasion been treated for a long period of time as undulant acne. Treatment consists of some rational regulation of the diet; it is well to eliminate excess of sweets. Careful toilet of the acne-bearing regions, namely, face, shoulders, chest, and back, and manual expression of the comedones (a few at a time) are indicated. The application of lotio alba or mild sulfur ointment is very helpful. Ultraviolet light up to peeling intensity may be of great benefit. In severe cases divided doses of x-ray frequently improve the condition when all other forms of therapy failed. (This is particularly helpful where much scarring occurs.)

CHAIRMAN CANNON.—Furuncles may arise as a complication of acne or independently. We have found a good treatment to be the following salve, applied to bring the boil to a head:

℞ Salicylic acid	3x
Fluid extract of ergot	3iss
Phenol	3v
Ung. zinc oxide q.s.	℥i

Phenol, 10 per cent, injected into the boil with a hypodermic syringe will abort a number of them, especially if combined with ½ unit of x-ray. Concentrated phenol on a sharp stick makes a relatively painless method of opening a boil.

We prepare an autogenous vaccine and give 0.5 to 1 c.c. every five days intracutaneously with colloidal manganese intramuscularly for several weeks, as a preventive for further boils.

Animal Parasites

Scabies

CHAIRMAN CANNON.—And now, Dr. Machacek, you might give us a few words about scabies.

DR. MACHACEK.—The diagnosis of scabies is made on recognition of the characteristic burrow situated on the webs of the fingers. The eruption is usually seen on the buttocks, the forearms, the genitals, the lower abdomen, about the breasts, and in the anterior axillary folds. It itches intensely, is papular, vesicular, and pustular in character. This is particularly true in infants in whom it may be simulated by certain types of papular urticaria and eczema.

In doubtful cases the contents of the individual lesions must be examined for the presence of the *Acarus scabiei* or the ova. The history of more intense itching at night and the presence of similar lesions in other members of the family are extremely helpful. The treatment of this condition depends upon the external application of sulfur and the alleviation of secondary dermatitis. The sulfur ointment used on infants and young children must be weak, 2 to 5 per cent; in older individuals strengths of 10 to 15 per cent are used. Wilkinson's ointment is a popular formula where there is marked eczematization and lichenification.

The main danger in treating these cases is the resultant dermatitis due to the external applications. This requires soothing baths and ointments.

DR. KOHN.—When you apply the ointment do you apply it all over, or just to the lesions?

CHAIRMAN CANNON.—We have the patient take a hot bath every night, making a thick lather all over the skin and using a washcloth in order to break open the vesicles and remove the crusts. The skin is then thoroughly dried with a rough

towel and then a 5 per cent sulfur and zinc oxide ointment or plain Lassar's paste is gently rubbed all over the body and extremities, paying particular attention to the affected parts. The child may be allowed to wear the same underclothes and night clothes and use the same bed linen for four days. The child is then given a thorough bath, after which the skin is anointed with plain calamine lotion or with zinc oxide ointment, and fresh underclothing, and night clothing and bed linen are used. Should there be any question of the cure after the four applications of the ointment, one may use it for the fifth night. Should there by any indications of a dermatitis before the treatment is completed, one should skip those areas in applying the sulfur ointment and use plain zinc oxide ointment on the areas of dermatitis.

Other members of the family that have evidence of scabies should be treated at the same time in order to prevent a reinfection of the child with the disease.

CHAIRMAN CANNON.—Would you say a word about erythema multiforme, Dr. Miller?

Erythema Group

Erythema Multiforme

DR. MILLER.—As the name implies, erythema multiforme may include macular, papular, urticarial, bullous, or hemorrhagic lesions, symmetrically distributed, and of a bright to dark red color. The usual sites are the upper part of the face, neck, forearms, legs, and dorsal surface of hands and feet. The mucous membranes may be involved.

The exact etiology is unknown, but absorption of improperly digested food, stale fish, nervous strain, foci of infection and various drugs may cause the outbreak.

CHAIRMAN CANNON.—I think that the most notable results in the treatment of erythema multiforme are obtained when the specific cause can be found and removed, such as stopping the use of a drug which has been responsible for the erythema multiforme, or the removal of a focus of infection. When we are unable to determine the cause of the eruption, one can oftentimes obtain a cure by injecting 10 to 15 c.c. of whole blood into the muscles of the buttocks by massaging the parts, and at the same time injecting ephedrine. The injection should be repeated every five to seven days and doses of ephedrine should be given by mouth. Locally, we recommend cornstarch, oatmeal, or bran baths, followed by the application of calamine lotion containing 1 per cent phenol and 10 per cent sodium bicarbonate. The bowels should be carefully regulated, and as liquid a diet as possible maintained until the lesions disappear. Sometimes an alcohol or witch hazel rub will serve to relieve the patient of the itching and local discomfort.

DR. MACHACEK.—Erythema multiforme is really not a disease but a symptom complex. It may be the result of such common drugs as phenolphthalein, antipyrine, arsenic, iodide and bromide compounds, salicylates, nirvanol. It may follow dental infection, or it may be the result of virus infection such as foot and mouth disease. Varicella masked by a dermatitis medicamentosa may simulate bullous erythema multiforme. There is a symptom complex which has all the general earmarks of erythema multiforme which shows an intense conjunctivitis and stomatitis. Sometimes the symptoms are so extreme that dysphagia causes inanition and dehydration necessitating clyses, infusions, and even transfusions to alleviate the general reaction and even to save the patient's life.

Drug Eruptions—Dermatitis Medicamentosa

CHAIRMAN CANNON.—Drug eruptions may produce almost any type of skin eruption. Certain drugs, however, produce characteristic lesions. Phenolphthalein, for instance, may cause bullous lesions in the mouth but at the same time may

cause a characteristic fixed eruption. This fixed eruption is a smooth, macular plaque varying from a slate to a violaceous color.

The bromides produce an acneform eruption with considerable number of pustules. These may fuse to form vegetative lesions.

The iodides also cause acneform eruptions. A common source of iodine is in iodized table salt. For the bromides and iodides, we have found intravenous and oral administration of sodium chloride to be of particular value in hastening elimination of the bromine and iodine.

Arsenic causes fairly distinctive symptoms and signs such as neuritis, generalized exfoliation dermatitis, and, in long-standing cases, keratosis. The sources of arsenic are many, including arsphenamine, cacodylate of iron, Fowler's solution, and green vegetables and fruits that have been sprayed.

Dermatitis Venenata

CHAIRMAN CANNON.—Poison ivy is well known to you all, with its superficial vesicles, scratch marks, edema, and marked itching.

We find after exposure or in the very beginning of attack, thorough washing with laundry soap and water, followed by 50 per cent alcohol, will prevent most attacks. Benzine may also be used, followed by alcohol. But as soon as attack is established, this treatment is not only useless but rather aggravates condition.

We then use:

℞ Acid boric	3iv
Liq. plumbi subacet. dil.	3vi
Zinc oxide	
Calamine	
Ol. olive āā	3i
Aq. calcis	
Aq. rosae āā q.s.	℥xii
M. Sig.	

applied many times a day to relieve itching. The subacetate of lead precipitates the oil, preventing further spread. We also use ivyol (Mulford) by intramuscular injection.

As a preventive, we give:

℞ Tinc. Rhus toxicodendron	gr. 20
Spiritus vini recti	oz. ½
Syrup aurantii corticus q.s.	oz. 4
Sig. One drop t.i.d. Increase 1 drop each dose daily up to 20 drops t.i.d. Continue all season.	

CHAIRMAN CANNON.—Miss Bishop, will you discuss the value of scratch and patch tests in allergic conditions and dermatitis venenata?

MISS BISHOP.—The large percentage of the allergies in the first two years of infancy is due to food, of which milk, eggs, and wheat are the chief offenders. Thereafter, inhalants, such as dust, fungus, and pollens, become increasingly significant. Drug allergies and contact dermatitis are also causes of skin lesions in infants.

The most accurate method of testing for idiosyncrasy is diet control. Since this is such a slow process, skin testing, although not exact, is of value. The scratch test seems to be steadily gaining more popularity than the intradermal. It must always be kept in mind that no method of skin testing yields absolutely reliable results. A positive test merely indicates a suspicious substance rather than a culprit. Since testing at best is fraught with so much inaccuracy, the practice of group food test-

ing is to be discouraged. If the circumstances do not permit complete food testing, it is better to test the most suspicious ones separately rather than to cover all foods in groups. It may be well to say here that before six months of age skin tests in infants are believed valueless. The patch test is indicated in cases of superficial epidermal sensitization. A substance which is to be patch tested must be applied in strength which will not affect the normal skin. Since there are so few references in the literature to control concentrations for the many things to be tested, such as plants, insect sprays, etc., it is necessary for the physician to check every positive reaction with at least one negative control. This procedure rules out misguiding clues.

Scaling Dermatoses

Psoriasis

CHAIRMAN CANNON.—Psoriasis is a disease of unknown cause, which cannot be cured but can be cleared up and may remain cleared up for many years. The lesions vary in size from pinhead to large patches. It may be acute and widespread or chronic and inveterate. Always there is a dry, silvery scale, which on removal leaves typical pin-point areas of bleeding. Characteristic areas of location are the scalp, nails, elbows, knees, and fold of buttocks. On the scalp it may be recognized by areas of normal scalp. The typical lesions of the nail are pinhead-sized pits, but nails may also be deformed, discolored, fissured, and distal ends lifted up by accumulation of scale.

Since psoriasis is associated with rheumatism in about 35 to 40 per cent of cases, many think it is of streptococcus origin. Dr. Miller, will you discuss the treatment?

DR. MILLER.—Although psoriasis cannot be cured in the sense of preventing recurrence, individual outbreaks can and should be cleaned up as this will prolong the lesion-free period and tend to lessen severity of attack.

The essential point in treatment is thorough removal of the scales each time before applying local treatment. Soda bicarbonate baths, ¼ lb. to a tub of water, materially aid loosening the scale. Remaining scales should be scraped off. Patient should be warned to expect bleeding when scale is removed, as this is typical of psoriasis.

The best single drug is chrysarobin in 1 to 10 per cent ointment on chronic lesions; it must not be used in acute cases as it may cause a rapid and severe spread.

For acute cases 5 to 10 per cent ammoniated mercury is applied at night, and liquor carbonis detergens is painted on in the morning. Nails should be scraped with a curette until pits and scales are removed.

Ultraviolet light is a very valuable treatment. Expose body all over, especially after lesions are freed of scale and are painted with liquor carbonis detergens. Natural sunlight has the same effect.

X-ray in fractional doses is a very efficient mode of treatment but, because of the chronicity of the disease, may easily lead to an x-ray burn.

DR. VAN KLEECK.—Have you had any success with manganese?

DR. MILLER.—Yes, it is useful in hastening improvement.

Pityriasis Rosea

CHAIRMAN CANNON.—Pityriasis rosea is a self-limited disease occurring in the so-called bathing suit distribution and characterized by individual oval patches covered with a finely crinkled dry scale. Then patches are distributed in the lines of cleavage. The disease is many times preceded by a herald patch, which appears several days before. The main importance of the disease is to recognize it as such and not to overtreat it.

Treatment consists of soothing measures, such as calamine lotion and bran baths. Alpine light hastens recovery.

Congenital Defects

Nevi

DR. MILLER.—We have a fair amount of success in treating macular nevi with blistering doses of ultraviolet light. This method is harmless, never scars, and gives a good result. Radium and dry ice are mentioned only to be condemned.

Hemangiomas

Two methods of treatment are of distinct advantage. The first is radium, which correctly applied with proper dosage and time intervals gives excellent results. The second is carbon dioxide, known as dry ice, which is easily obtained from any soda fountain. A paper pattern the size of lesion is first made and ice trimmed to fit this pattern. Ice is then held with sheet rubber and applied with gentle pressure for about one minute to the hemangioma. Lesion is dressed with boric ointment daily until healing results.

CHAIRMAN CANNON.—Nearly all raised angiomas can be cured in one treatment, and the cosmetic result is very good.

DR. ANDERSON (RICHMOND, VA.).—May I ask if there is any disadvantage in covering a larger area than the lesion?

CHAIRMAN CANNON.—No. It does no harm, but one wishes to avoid all scarring.

DR. GENGENBACH.—Can it be used about the lips?

CHAIRMAN CANNON.—Yes. I have also used it successfully on the eyelids.

Ichthyosis

CHAIRMAN CANNON.—Ichthyosis is a congenital disease which shows all grades of involvement from a mild, dry, scaly skin to intense thickening, scaling, and loss of elasticity of the skin. It is due to deficient secretion of the oil glands. It is worse in winter and better in summer.

The essential of treatment is to protect the skin in cold weather and to supply oil to skin. Cocoa butter or Nivea oil applied immediately following bath will alleviate symptoms in many cases. Ultraviolet light is of some value. Thyroid medication is of value in patients with low basal metabolic rates due to thyroid deficiency.

Alopecia Areata

CHAIRMAN CANNON.—Alopecia areata is characterized by a rapid, complete loss of hair in patches. These patches are smooth and hairless and show no signs of redness, folliculitis or scaling. Usually only the scalp is involved but any hairy area may be. Usually recovery begins with a downy growth of hair, followed by stronger hair, frequently with a loss of pigment. At other times new patches appear and coalesce with previous patches until all hair is lost.

Treatment aids natural recovery. The best treatment is irradiation with the water-cooled Kromayer light, enough to give a burn. Then the area should be painted with 50 per cent phenol until it turns white, and then it should be neutralized with 50 per cent alcohol. Blood arsenic should always be studied, as some cases seem to be caused by arsenic retention. Sodium thiosulfate is of value, given intravenously and by mouth. Basal metabolic tests should be made, and if the rate is low, thyroid medication is given. Other glandular extracts such as antuitrin are of no value.

Keloids

CHAIRMAN CANNON.—Some people, particularly negroes, develop hypertrophied scars at sites of injury. There is only one treatment: filtered x-ray in

¾ unit doses, repeated at fairly long intervals, one to three months. Scars may be burned down with trichloracetic acid before x-ray treatment.

Warts

CHAIRMAN CANNON.—The ordinary wart, verruca vulgaris, may be best treated by removal with the desiccating current under novocain anesthesia, painted once with iodine, and kept bandaged with boric ointment. Gentian violet without bandage may also be used on children who remove the bandages.

Another method is removal of the wart with a curette under ethyl chloride anesthesia.

When warts occur around nails, it is generally better to use x-ray, as the wounds become infected easily.

Wart vaccine gives either a spectacular result or is worthless. When the warts are numerous, it is well worth trying. It is made as follows:

Wart Vaccine

Removal.—Warts are washed with alcohol, anesthetized with novocain, and removed by curettage.

Preparation.—Five or six large warts are pulverized in a sterile mortar, using 5 c.c. physiologic saline. The suspension is allowed to stand at room temperature overnight. The next day the mixture is heated for one hour in a water bath at 60°. It is then plated for sterility. Five cubic centimeters of saline, containing 1 per cent phenol, are added to the suspension. The supernatant fluid is poured off and bottled.

To be given at five-day intervals. Dosage—0.5 c.c. for the first four injections. Remaining doses—0.75 c.c. Injection is given intracutaneously (inject so that a wheal is formed under the skin). If marked redness and swelling ensue from the last injection, reduce the amount of the next injection to the lower preceding dose.

Another variety of warts are the juvenile or flat warts, sometimes occurring in great numbers on the face. These are particularly difficult to treat. We have found scraping off the warts with a curette after freezing with ethyl chloride and painting with 10 per cent phenol, neutralized with alcohol after a few seconds, to be a particularly efficient method.

A small number may be removed by the desiccating current and fractional doses of x-ray used.

Wart vaccine also is either of great value or useless in this condition.

Plantar warts are best treated with filtered x-ray by a competent man. Although a relatively simple thing, often patience, skill, and knowledge are required to cure them.

Molluscum Contagiosum

CHAIRMAN CANNON.—This is manifested by rounded or flat papules varying from one to many and from pinhead to bean-sized, with a characteristic depressed center from which the "molluscum body" may be expressed. This depressed center may be made more prominent by freezing with ethyl chloride.

Treatment is curettage followed by phenol and iodine.

LEE FORREST HILL, M.D., Des Moines, Iowa
H. B. METTEL, M.D., Indianapolis, Ind.
Secretaries.

SUPPLEMENTARY REPORT OF REGION I*

Reports of State Chairmen

Ontario.—Ontario, under the able leadership of Dr. Tisdall, is carrying on much active work in most of the fifteen activities mentioned, and a great deal of this work is being done by Fellows of the Academy. In the field of scientific pediatrics, many of the Fellows are active in the Canadian Society for the Study of Diseases of Children and in the Department of Pediatrics of the University of Toronto and its associated hospitals. Other Fellows are prominent in the scientific work of the Pediatric Section of the Academy of Medicine in Toronto.

Others are organizing a section of Pediatrics in the Ontario Medical Association. Postgraduate education has been made available in the Department of Pediatrics of the University of Toronto. The Academy is placed in the most favorable position for influence with public health authorities through the connections of one of Ontario's outstanding Fellows of the Academy, Dr. Alan Brown, who is pediatric consultant to the Department of Health of the City of Toronto, the Department of Health of the Province of Ontario, and the Federal Department of Health of Canada.

Quebec.—The two racial and cultural groups in the Province of Quebec, each having a university, separate charitable organizations, etc., make Dr. Goldbloom's problems of advancing scientific knowledge and coordinating child health services in Quebec very difficult to achieve in the near future, because the Fellows of the Academy in Quebec are all of the English speaking group. Both racial groups carry on various types of maternal and child health work, well-baby clinics, and the City of Montreal furnishes some toxoid and vaccine material. Childhood tuberculosis is rather well looked after, and in view of the routine French method of giving B.C.G. vaccine at birth to infants, the eventual research statistics of the two racial groups as to tuberculosis development in later life may be of great practical value to the rest of the country. Dr. Goldbloom's members of the Academy are active in hospital and university pediatric fields, but coordination of the public health authorities and medical profession can only come about if a majority of the French pediatrists should become interested in the Academy and its ideals and objectives.

Maine.—Dr. Foster has increased the state Academy membership to six and reports that all of the members are active in forwarding pediatric knowledge and promoting child health services in various parts of the state. Some of the Fellows, headed by Dr. Foster, have given lectures to county medical societies as to recent developments in child health services.

The most promising development of the past year has been the formation of the Maine Children's Council, a semiofficial organization, with representatives from all health and welfare organizations in the state. Dr. Foster has been elected president of this council.

Through this development, in addition to the Fellows' connections with the state medical society and state department of health, the Academy membership in this state will be in a position to advance coordination of child health services and pediatric knowledge to a much higher degree in the coming year.

New Hampshire.—In New Hampshire, under the chairmanship of Dr. Rogers, the setup by which the state department of health cooperates through an advisory committee, made up of representatives from the Division of Maternal and Child

*See account of meeting in March, 1938, issue, p. 414.

Health, the New Hampshire Medical Society, the American Academy of Pediatrics, the New Hampshire Dental Society, the Society for Crippled Children, and the State Cancer Commission, is operating with increased efficiency. Dr. Rogers is a member of this committee, together with two other Fellows of the Academy, and they promote coordination of the health department with the medical profession and other health and welfare groups in many fields of child health.

They are promoting courses in pediatrics, free diphtheria toxoid and smallpox vaccine, the care of crippled children, and have been successful in having pneumonia serum furnished free by the state.

Vermont.—In Vermont, the state chairman, Dr. C. K. Johnson, is carrying on an excellent program of educating both physicians and the public in child health, through a committee with Dr. Johnson acting as chairman. This committee is supervising maternal and child health work for the state. Six child health centers, staffed by 35 nurses under the direction of local physicians carry on child health clinics and special preschool clinics.

Dr. Johnson and other Fellows of the Academy have been presenting pediatric subjects throughout the state before county medical societies and report large attendance and much interest shown by the medical profession. Thus the work of education and coordination is being well carried forward in Vermont.

Massachusetts.—Massachussetts is fortunate in having an extremely capable chairman, Dr. Warren Sisson, and a large number of Fellows who are able pediatrists. The outstanding contribution of Massachusetts and the New England Pediatric Society to scientific pediatric knowledge was the splendid scientific program put on in Boston for Region I in November, 1937. The type and quality of pediatric material presented was superlative, and the entire Fellowship of Region I owes a debt of gratitude to the Massachusetts Fellowship for their efforts in this direction.

This able group carries on in all of the fields of Academy activities and has developed close cooperation between the state department of health and the state and county medical professions by supervising the graduate teaching in pediatrics. The three particular fields that have engaged the special interest of the Fellows of the Academy in Massachusetts are presented as follows in a quotation from Dr. Sisson's report:

"There are three particular fields that have engaged the interest of the Fellows of the Academy in Massachusetts. These are:

1. Nonprofit summer camps
2. Postgraduate teaching
3. Cooperation with the state department of health in child health activities.

"1. We feel that the summer camp interests here have been greatly neglected and that a medical cooperation is essential. We have 15,000-20,000 children who go to these camps annually, and about a half million dollars are expended. Through our interest and help "A Study of Summer Camps" has been compiled by the Boston social agencies. This volume will be of interest to any Fellow engaged in this work and can be obtained by writing to the Bureau of Research and Studies, Boston Council of Social Agencies, 80 Federal St., Boston. This study will form the basis of great improvement and expansion of our camps.

"2. We have been in charge of the graduate teaching in pediatrics carried out under the auspices of the Massachuetts Medical Society, the state board of health and the federal government. Fifteen Fellows have engaged in this work which has been very well received.

"3. The third activity concerns our interest in the problem of the premature infant. This has now been organized so that we have some forty centers where premature infants may be cared for. Fellows of the Academy have cooperated in

strategic positions in this development. Important teaching of nurses for these centers in hospitals is now going on. This interest in the premature infant is a part of the state board of health's program and sponsored by it."

Rhode Island.—While the number of Fellows in Rhode Island is naturally few, they have been very active during the past year under the direction of Dr. Utter, chairman. Pediatric knowledge has been improved by the work of the various Fellows who are in charge of the pediatric staffs at several of the important hospitals in the state.

In addition, the Fellows, under Dr. Utter's direction, have been giving lectures on various phases of pediatrics before the county medical societies, with excellent effect. Social Security Act funds have been allowed for pediatric consultations for deserving children and the work has been kept free from abuse by having it done by Fellows of the Academy. The individual Fellows are active in many organizations carrying on child health work, and several of them are particularly interested in the health of children in summer camps.

Connecticut.—In Connecticut the Academy and its child health work are progressing rapidly because its state chairman, Dr. Linde, has served for several years as chairman of the public health committee of the state medical society. This group serves, in an advisory capacity, the Maternal and Child Health Bureau of the Connecticut Department of Health.

This valuable setup, in addition to the fact that there are several Fellows of the Academy on this committee, makes it possible for the Connecticut Academy to promote quite extensive work in many of the Academy activity fields.

Scientific pediatric knowledge is promoted through the pediatric department of Yale University, and refresher courses are given by Fellows under the supervision of the state medical society acting with the state department of health. In addition to the child health activities in connection with the state medical society and state department of health, the public health committee has developed interest in building a training school for mental defectives and in promoting child guidance clinics and has interested itself in studies now being made of adolescents at Yale University. These adolescent studies may prove quite valuable to the Academy Fellowship at large because of the present trends which point toward the pediatrist assuming, to a large degree, the care of adolescents in the near future.

Working through the public health committee, legislation in connection with the Connecticut Child Welfare Association is supported on behalf of better Child Health. A study and demonstration by the New Haven Council of Boy Scouts of America of the health of children in summer camps was held, with Fellows of the Academy and the state chairmen participating. In all of these child health fields the Academy Fellowship has thus become the directing group in this state.

New York.—Dr. Laws and Dr. Beaven, state chairmen, are rapidly increasing the influence of the Academy and its Fellows in New York City and in New York State. Three able Academy Fellows are on the state department of health committee which carries out the provisions of the Maternal and Child Welfare Act, and the state commissioner of health has stated that he is using the members and fabric of the Academy to help in the administration of all the child health work of his department.

The pediatric departments in the medical schools in Buffalo, Rochester, Syracuse and Albany furnish postgraduate courses and the New York State Medical Society sponsors further courses which have been given for the benefit of physicians in rural districts. The state chairman of the Public Health Committee of the New York State Medical Society has been urged by the Academy to develop more pediatric courses this coming year.

The Academy has fostered better medical care in children's camps, in addition to the sanitary camp systems which are strictly governed by the state department of health.

Plans are being laid to promote the formation of child health committees in both the state medical society and all of the county medical societies of the state.

In New York City, the New York County Medical Society (which incidentally is regarded as the largest county medical society in the world—some 7,000 members) has, as a result of the presidency last year of an able Academy Fellow, Dr. Adolph G. DeSanctis, a very live committee on child health, mainly composed of Academy Fellows. They have been very active in investigating child health facilities in New York City. They have made a survey of 88 hospitals in Greater New York City in order to find out the facilities for the care of premature babies and have made recommendations thereafter to the New York City Health Commissioner. Also, as a result of some of these activities, the State Commissioner of Health has appointed an advisory committee of pediatricians to study all phases of child health and maternal welfare in the state, and again, this committee is largely composed of Fellows of the Academy. Other subcommittees of this child health committee have been formed to study the care of the cardiac child; the hard-of-hearing child; school health examinations in public and private schools; compulsory health examinations for nursemaids; child labor problems; adequate care of mental defectives; childhood tuberculosis; vaginitis; and congenital syphilis.

Special child health committees are being formed in the county medical societies of Kings and Queens of New York City, and they are forming the same type of subcommittees to make the same studies as listed above, in their respective counties.

Many Fellows are on special committees of the city department of health for the training of child health personnel of that department. Two full-time pediatricians are training physicians in the baby health stations.

A special experimental maternal and child health station is being financed with social security funds and directed by a Fellow of the Academy. In each of the new health districts in New York City, medical advisory committees have been appointed to study health conditions in each district.

On all of these committees are many of our Academy Fellows. Thus, it can be seen that the large Fellowship in New York City and New York State is being increasingly useful in child health leadership in the state and county medical societies, and state and local boards of health.

Pennsylvania.—Under the leadership of State Chairmen Stokes and McCluskey, the Fellowship of the Academy has been used under the direction of Dr. Samuel McC. Hamill, chairman of the Emergency Child Health Committee of the state, to expand further the responsibility of the state and county medical societies for child health developments. We quote from the state chairman's report, which shows some new developments in this plan:

"The chief activity of the American Academy of Pediatrics in Pennsylvania, as formerly, has centered about the work of the Emergency Child Health Committee, the chairman of which is Dr. Samuel McC. Hamill. It is fortunate that the work of this committee has furnished a point of focus for major pediatric activities, since its gradual development has resulted in greater statewide interest in pediatrics and a breadth of vision in future health programs for the state which few other types of medical work could have furnished.

"Fifty-nine of the 67 counties of the state were originally organized for preventive medical care of children of the indigent, and at present about forty-eight of these counties are actively engaged in the work with increasing interest. Much work has also been accomplished in the correction of defects found. Now in addition to the care of the indigent, a statewide proposed plan has been launched which would in-

clude not only the care of the indigent, but would also include, as an educational procedure, the protective care of children and families who can afford to pay for it. This proposed plan is a natural outgrowth of the work of the Emergency Child Health Committee and will be an incentive to all physicians throughout the state to take a greater interest in preventive medicine and health work, particularly during infancy, childhood, and early adolescence. This committee has also been given approximately 120 W.P.A. workers in counties of the state to assist in their work during the past year.''

Pediatric institutes have been held throughout the state with some success. Under the auspices of the state medical society and the Committee on Pediatric Education, Fellows have been available for postgraduate clinics or lectures to all county medical societies on request.

As time has passed, largely through Dr. Hamill's devotion to this work with the help of the Fellows of the Academy, the general medical profession of Pennsylvania has thus developed a fine system of responsibility for child health in most of the counties of the state. Such work is bound to gain momentum with each year, as it is founded on the practical basis of enlisting the active interest, cooperation and services of a great number of practicing physicians by giving the responsibility to the county medical societies.

Maryland.—Dr. Smith, in Maryland, reports a refresher course held at the University of Maryland, consisting of three weeks of clinical pediatrics, which was attended mainly by physicians from counties outside of Baltimore County. At Johns Hopkins and the University of Maryland, physicians are always welcome to attend ward rounds and staff meetings and clinics and can arrange to work in out-patient departments. In this way, pediatric knowledge is available for physicians in and near Baltimore.

Physicians in the counties on the Eastern Shore and in southern Maryland have been furnished speakers at their request on various child health subjects, and these meetings were well attended. It seems that these may be developed into regular extension courses in pediatrics in such counties.

A Fellow of the Academy, Dr. J. H. Mason Knox, is the Director of Child Health of the Maryland Department of Health, and among many other activities furnishes consulting pediatricians in southern Maryland and on the Eastern Shore.

In both of these fields, the Fellows of the Academy are well represented.

District of Columbia.—Under the leadership of Dr. Donnally, the Fellows of the Academy have been most active in forwarding Academy activities.

The pediatrists of the District of Columbia have organized the Pediatric Section of the District of Columbia Medical Society, which is helping our Fellows to solve scientific pediatric problems, as well as problems arising in the practice of pediatrics. This section meets monthly, and in January, 1938, presented an entire program on preventive pediatrics before the general District of Columbia Medical Society, dealing particularly with nutritional problems and the prevention of communicable diseases.

Dr. Donnally also personally coordinates the activities of the Maternal Welfare Section and the Pediatric Section by attending the meetings of the Maternal Welfare Section and participating in its various committee activities.

The Pediatric Section has presented frequently, at its monthly meetings, important child health subjects, such as vitamins, rheumatic fever, symposium on squint, bacteriology and management of endemics of nursery diarrhea in obstetrical hospitals, etc.

Fellows of the Academy cooperate with the Bureau of Child Hygiene of the health department, particularly with reference to the prevention of communicable diseases.

Cooperation with the Health Department of the District of Columbia and its hospitals, and other medical society activities is shown by the following quotation from Dr. Donnally's report:

"Two members of the American Academy of Pediatrics are members of the consultation committee of the medical society for the health officer of the District of Columbia and furnish advice with regard to the personnel and arrangements for child health work and municipal hospitals for children including the Pediatric Municipal Hospital, the Contagious Disease Hospital, and the Children's Tuberculosis Hospital. Serving on this committee, Dr. Wall and myself have met the health officer and his associates and inspected and made recommendations with regard to the hospital care for municipal cases of infants and children in the Gallinger Hospital.

"Improvements in facilities for contagious disease and pediatric care have been urged by us throughout the year, and we have supported the control of communicable diseases by members of the Medical Society of the District of Columbia. Postgraduate education in pediatrics for general practitioners has been promoted by intensive courses in February and September in the practical branches of medicine as well as in pediatrics.

"We have taken an interest in, and participated in, committee meetings and professional activities regarding tuberculosis control in childhood, routine child health supervision and mental hygiene, and adolescent problems through the Children's Hospital which constitutes our main pediatric center of activity in Washington."

New Jersey.—The New Jersey Fellows of the Academy have been able to make considerable progress in most of the Academy fields of activities because of two facts:

1. The fact that out of a total of 55 pediatrists in the state, 48 Fellows have been enrolled and are all enthusiastic workers for child health.

2. The fortunate circumstance that the state chairman for the Academy, Dr. Nichols, has been also, for several years, Chairman of the Public Health Committee and Child Health Committee of the New Jersey Medical Society, and a member of the New Jersey Board of Health, and chairman of the Public Health Committee of the State Department of Health. This triple connection and the available large number of Fellows has made possible the appointing of fourteen active committees to study child health problems in New Jersey, as assigned to their committee, and to make recommendations to the Academy, the state medical society, the State Department of Health and all other state and local agencies in New Jersey interested in child health, for the improvement of child health service in each of the fields listed below.

A list of these committees follows, and every Fellow of the Academy in New Jersey is serving on one of these committees:

Prenatal Care, Maternal Nursing, Newborn
Health Supervision of Infants
Health Supervision of Preschool Child
Health Supervision of School Age Child
Health Supervision of Adolescent, Mental Hygiene
Tuberculosis Control
Better Milk
Safety, Auto and Home Accidents, Burns, Poisons, etc.
Communicable Disease Control
Pediatric Scientific Problems
Pediatric Practice Problems
Postgraduate Education of Physicians in Child Health
Outstanding Annual Advances in Pediatrics

These latter committees have put on splendid pediatric programs at the two meetings of the state Academy held each year for the past three years.

In next year's report the progress of this comprehensive plan of having Academy Fellowship in New Jersey act as the advisory, coordinating and stimulating expert authority to all groups in New Jersey interested in child health, will be reported in detail.

A few preliminary notes on progress might be herein given. The first three committees have worked and will work in the closest cooperation with the Maternal Welfare Advisory Committee of the Public Health Committee of the New Jersey Medical Society.

A complete set of health supervision cards, covering the entire period from conception to the end of life, for the use of physicians generally, has been developed by the Fellows of the Academy and the public health committee of the state medical society, as follows: maternal and prenatal card; infant health supervision card; preschool health supervision card; school age health supervision card; adult health supervision card.

The first four of these may be of interest to our Fellows in other states. Samples of these cards will be available at the annual meeting in Del Monte, Calif.

The Committee on Pediatric Practice Problems who are charged with developing the field of child health supervision by the pediatrist, have already presented the first step of the four-point program designed by this committee to educate parents as to health supervision needs of their babies and children (through adolescence) in order to obtain the maximums of health for each child. This now has been adopted by the state Academy. This four-point program will consist of:

1. A folder to be given to parents showing the minimum desirable standards for the health supervision and care of infants and children, and prepared for the guidance of mothers and fathers by the New Jersey Fellows of the American Academy of Pediatrics.

2. The second point in this program will be the development of certificates to be given to parents (for each age group—infancy, preschool, school age child, possibly adolescence) who have faithfully carried out, under a pediatrist's direction and supervision, the minimum of health supervision and care outlined in the folder, for a given period.

3. The third point of the program will be the development of a simple score card by which the parents can score themselves as to the degree to which they are giving attention to the mental and physical health of their children.

4. The fourth and last point of this program will be the development of a loose-leaf record, which will be designed to contain the health record of a child from conception through the entire growth period, under medical supervision. This whole program is designed for the development of education of parents as to the possibilities of better child health, through medical supervision by a physician (with special training and experience in the curative and preventive aspects of health in infants and children).

A committee of the Fellows of the American Academy of Pediatrics, headed by Dr. Harrold Murray, has had charge of the postgraduate education of physicians of the state in child health during the past two years.

The state chairman of the Academy is the chief advisory pediatrician and consultant to the Bureau of Child Hygiene of the New Jersey State Department of Health, and the state Fellowship take an active part in all of the activities of that bureau, which has been carrying on a very comprehensive, complete program of child health for many years.

The state committee of the Academy is now the child health committee of the state medical society, and has charge of its child health activities in all its phases.

On this committee sit, as cooperating members, the chief of the Bureau of Child Hygiene of the state department of health, and the director of health of the department of education, thus connecting the child health activities of the Academy, the medical society and the state departments of health and education.

The state chairman and the state secretary of the Academy, Dr. LeRoy Wilkes (an outstanding Fellow, who is also the executive officer of the state medical society) are the two pediatric advisory members of the health committee of the state welfare department (New Jersey Department of Institutions and Agencies), and thus coordinate the Academy, the state medical society and the state medical profession, with the health of dependent, handicapped, neglected children, and child welfare generally.

Through its present setup, the Academy committees are preparing to be expert advisors to all state official and nonofficial groups dealing with phases of child health work, and thus will be the outstanding child health authority in this state.

Thus, the Academy Fellowship in New Jersey is definitely planning to exercise leadership and responsibility, through the activities of its Fellows, in every field having to do with child health in New Jersey and to thus fulfill the object of the Academy by increasing pediatric knowledge and "correlating all aspects of the work for the health of children which properly come within the scope of pediatrics."

Conclusions.—The previous general and state reports lead conclusively to the fact that under Dr. Schroeder's leadership, Region I has made marked progress during the past year in each state and province toward the aims, ideals, and objectives of the Academy as stated in the constitution. A study of the report of the state chairmen leads to the following conclusions as having some possible suggestive values toward further improving the influence of the Academy:

1. In larger states, state committees composed of outstanding and able pediatricians who have been good workers in child health fields have proved to be of considerable value.

2. In some states, annual meetings of the Fellows have proved of value toward the development of state programs of child health.

3. In all states it has seemed desirable, as far as possible, to assign each Fellow a specific part in the state program.

4. Outstanding progress in Academy programs has followed the appointment of Fellows to important active or advisory positions in state and county medical societies, state departments of health, education and welfare, and other health groups.

5. In states where special consideration is given to the promotion of pediatric knowledge, improvement results in the status of the pediatrist.

6. Where attention is given to the practical problems of pediatric practice, together with improvements in routine child health supervision and education of parents in this respect, definite results accrue to the specialist in pediatrics himself and the child health services he renders.

7. In a number of states a definite trend is developing toward the assumption by the pediatrist of that neglected age of growth, the period of adolescence.

8. In view of the aims of the Academy "to improve pediatric knowledge and correlate and stimulate child health services," it would seem that increased progress can be made in both of these directions by having the national, regional and state officers hold occasional conferences with federal, regional and state officials having charge of federal funds for maternal and child health and public health services, for the purpose of establishing sound foundations in each state for the utilization of these funds to the best advantage for the promotion of pediatric knowledge and increased efficiency in child health services. (These officials have been most co-

operative and helpful in the past, including the Children's Bureau, the medical policy of which is directed by Dr. Martha Eliot, Assistant Director of the Children's Bureau and a Fellow of the Academy, assisted by a medical staff many of whom are Fellows, such as Dr. Ethel C. Dunham, former state chairman of Connecticut, Dr. Doris Murray, Regional Child Health Field Director, both of whom are Fellows; Dr. Edwin F. Daily, Director of the Maternal and Child Health Division, and many others; for the United States Public Health Service, Dr. Thomas Parran, Surgeon General, who has a most cooperative outlook on all public health medical services, and many of his staff including Dr. E. Coffey, Region I, Advisor of the Atlantic Division of the Public Health Service and directors and staffs of state departments of health. This is equally true as to holding conferences with maternal health divisions of the American Medical Association, state medical societies, and county medical societies, inasmuch as early child health improvement is to a considerable degree predicted on increasing the efficiency of prenatal, obstetric, and postnatal care of the child.

Respectfully submitted,

STANLEY NICHOLS,
Acting Regional Chairman.

SUPPLEMENTARY REPORT OF REGION III*

REPORTS OF STATE CHAIRMEN

Colorado.—The activities of the members in Colorado have been largely concentrated in cooperating with the work being done under the Social Security Act.

The main objectives of the division of maternal and child health are:

1. Prenatal and well-baby clinics and conferences.
2. Free distribution of literature on maternal and child health.
3. Immunization of children against smallpox, diphtheria and typhoid fever.
4. Postgraduate courses in obstetrics and in pediatrics, for practicing physicians.
5. Financing in part the training and employing of county public health nurses.
6. Cooperation in the syphilis control program of the Colorado State Board of Health.
7. A dental hygiene program.
8. The establishment of child health conferences.

FRANKLIN P. GENGENBACH
State Chairman.

Illinois.—Members of the American Academy of Pediatrics are cooperating fully with the federal maternal and child welfare program through the department of health, the State of Illinois, and the Educational Committee of the Illinois State Medical Society.

Fifty-eight members have signified their willingness to speak on any one of three subjects selected by the county society. These talks are given before the councillor, district, or county groups. The Illinois Department of Health through its Division of Child Hygiene and Public Health Nursing reimburses the physician for traveling expenses and pays a small honorarium.

During the past summer a postgraduate course was given in pediatrics and obstetrics. Physicians from the state registered for one week of intensive work at the

*See account of meeting in May, 1938, issue, p. 697.

Research Hospital of the University of Illinois, paying their own expenses and a $10 registration fee. The course ran for two months. There was an attendance of 70 physicians.

Members of the Academy are cooperating with members appointed by the governor on poliomyelitis and other health problems.

At the present time, the great needs in this state are for more institutions for the care of the mentally subnormal child, convalescent camps for children, and sanitarium beds for the childhood type of tuberculosis.

MAURICE L. BLATT
State Chairman.

Iowa.—The chief activity of the Iowa group at the present time is concerned with the giving of refresher courses in pediatrics. These courses were begun last spring and proved so popular that requests were made for their repetition this fall.

As arranged at present, two-hour talks on selected pediatric subjects will be given in each of five Iowa towns and later the same series of lectures will be given in five other towns. The talks are being prepared and given by pediatricians, most of whom are members of the Academy.

These refresher courses, together with classes arranged for instruction in motherhood, represent the activities now being conducted by the state department of health in its program under Part I, Title V of the Social Security Act.

Plans have been discussed for participation in child welfare programs of physicians not limiting their practice to pediatrics but nevertheless who are interested in child health. Since there are relatively few pediatricians in Iowa, it is felt that the inclusion of a moderate number of physicians of this type in pediatric activities would provide means for raising the standards of pediatric care over a fairly wide territory. How soon such plans can be gotten under way is problematical, but the Academy committee is interested in them and hopes to get something of the sort under way in the near future.

LEE FORREST HILL
State Chairman.

Michigan.—The past year has been a busy and progressive year for the Michigan members of the American Academy of Pediatrics. Having functioned as a group since 1932, the difficulties which beset a new group have been practically overcome. There are 48 active members in Michigan. There are 14 men in Michigan who have been accepted by the Board of Pediatrics who are not members of the Academy. Of this number, nine may be suitable applicants for Academy membership in the future.

Having passed the state of organization, it has been possible for us to devote our attention to the projects in Michigan which have seemed most important at this time. Of necessity, much of the work has been carried on by committees which have reported to the membership at our quarterly meetings. In many instances it has been possible to cooperate with various agencies and accomplish our aim through such cooperation.

We are fortunate in Michigan in having the secretary of the state medical society as a member of our group. The director of the Maternal Health and Child Welfare Department is also a member of the Academy.

Under the Afflicted Child Act of Michigan, a series of county filter committees were set up. In the counties in which members of the Academy reside, at least one member of the Academy was appointed to this committee. In the state medical society section of pediatrics, the officers are members of the Academy.

We have been unfortunate in the loss of one of our members, Dr. Thomas D. Gordon, during the past year. A second member, Dr. Florence Browne, has moved to New York.

The committee appointed to cooperate with the state department of health on matters pertaining to the Social Security Act provisions as they apply to children held two meetings with the director of the maternal and child welfare division of the state health department.

The committee on postgraduate instruction held several meetings with the state health department and arranged for the giving of a group of refresher course lectures throughout the state at five centers. This work covered a period of four weeks and was given by members of the Academy.

In addition, the annual three-day course was conducted at the Henry Ford and Children's Hospitals on April 19, 20, and 21, 1937. Forty-three registered for the course; their geographical distribution was as follows:

Michigan	33	New York	3
(Detroit, 17; outside Detroit, 16)		Massachusetts	1
		Maryland	2
Ohio	3	Canada	1

This number is somewhat smaller than for 1935 and 1936 (57 and 66, respectively). This may be accounted for in part by the filling of this need in northern Michigan by the government course. From the standpoint of the program, we were fortunate this year in having by far the most interesting group of speakers so far obtained, and we are deeply indebted to a number of men in various fields for their help.

The committee on nursing education met with the secretary of the state board of registration of nursing on several occasions. An attempt to reduce the pediatric training required of nurses seeking registration in Michigan was reported and the favorable action of the Board in preventing this reduction was reported at the meeting in Grand Rapids, Mich., on Sept. 28, 1937.

Committees have been appointed to cooperate with the state department of health in studying the causes of death from diarrhea and to outline the methods of reducing this so far as possible.

A committee has also been appointed to act in an advisory capacity with other groups in Michigan in considering the best method of approach to the subject of sex education in the schools. A law was passed at the last legislature providing for such instruction, and it is our desire that this teaching be considered very carefully before it is undertaken on a large scale, since we felt it is a subject which will require a great deal of thought in order to accomplish the desired results and not result in disaster.

A committee of the Academy prepared a series of radio addresses which were used by the state medical society over eight stations in Michigan.

On Jan. 6, 1937, a dinner meeting was held at Detroit. A second meeting was held in June just before the meeting of the Academy at New York.

On Sept. 28, 1937, a meeting was held at Grand Rapids, Michigan, at the time of the state medical society meeting. This enabled the members to attend the section meeting of the state society. At this meeting we were honored by having our regional chairman, Dr. A. Graeme Mitchell, as our guest for the evening.

Looking forward, we hope to continue our activities along educational lines. We shall serve in an advisory capacity whenever we feel we can aid a worth-while project. When necessary, we shall urge caution and forbearing in matters which do not seem well organized or in the best interests of the community as a whole and children in particular. It is true that most projects are developed with the purpose of aiding the community, but at times the people who are sponsoring the program

do not always weigh all matters pertaining to the work with care before embarking upon their plan. We feel it is within our province to draw to their attention methods or means by which they may be prevented from bringing harm upon themselves and the children for whom the program was devised.

We realize that our contribution to society and particularly the children of Michigan is but a small part, but we shall continue to make our portion as useful and worth while as possible.

EDGAR E. MARTMER
State Chairman.

Minnesota.—During the past year the principal task of your state chairman has been to cooperate with the agencies already in the field, including the Minnesota State Medical Society, the Northwest Pediatric Society, the Minnesota Public Health Association, the Extension Division of the University of Minnesota, and, above all, the maternal and child welfare department of the Division of Child Hygiene of the Minnesota Department of Health. One of our members, Dr. Erling S. Platou, is a member of the state board of health; and two others, Dr. H. F. Helmholz and your state chairman, are members of the advisory committee for child welfare.

During the past year, the state board of health has sponsored a refresher course for physicians, consisting of seven obstetric and seven pediatric lectures in different strategic sections throughout the state. This refresher course has been very popular and will, in all probability, be renewed next year. A somewhat similar series of refresher courses is being offered to the state public health nurses.

Our job for the next year is to continue to cooperate with the other local agencies in furthering their excellent programs.

E. J. HUENEKENS
State Chairman.

Ohio.—There has been no participation in the social security program to date.

The successor to Dr. Van Horn has been appointed. He is Dr. C. W. Thomas, a well-qualified pediatrist who has given enough time to general practice to be thoroughly alert to the problems of the prenatal and maternity care which dovetail into the child welfare projects. He expects to work with, and through, the Academy of Pediatrics to further the aims of the director of the social security program.

We now have in Ohio seventy-four pediatricians who are licensed by the Board and eighty pediatricians who are members of the American Academy of Pediatrics. There are twenty-one or more pediatricians who are eligible for membership in the Academy.

The state chairman is a member of the postgraduate committee of the state medical society and, in that capacity, outlines the lectures and recommends the lecturers who, of course, will be, or are, members of the American Academy of Pediatrics. I am finding support and interest on the part of the members. This program will follow somewhat the pattern of Michigan's program and is to run for a five-year period.

STERLING H. ASHMUN
State Chairman.

South Dakota.—In South Dakota greater effort than ever before has been made to carry on the maternal and child health program. This has been made possible through local, state, and federal funds from the United States Public Health Service.

The personnel consists of the state medical director, director of public health nursing, supervisor of public health nursing, and eleven separate county health

units, each directed by a full-time physician. In several of these counties there were no physicians until these health units were established. Even now this is the only medical service in some areas where the population is sparse and the distance between towns is great.

The combined activities consist of communicable disease control-immunization program; maternity service; infant and preschool hygiene; school hygiene—this is being stressed and all kindergarten children are given thorough examinations. Where any defects are found the parents are called on by the school nurse and urged to correct these defects. If they are not able to do so, as much help as possible is given. Freshman high school students are examined and given instruction relating to how they can improve their own physical condition. The crippled children's division has done excellent work.

The members of the Academy have given their support. In some cases they have given their services.

Although there is still a great deal to be done, I believe we have made definite progress.

GOLDIE E. ZIMMERMAN,
State Chairman.

Wisconsin.—There are sixteen members of the American Academy of Pediatrics in Wisconsin, twelve of whom reside in Milwaukee, three in Madison, and one in Superior. Living in a state which has for years been a proving ground for new ideas in the social field, we find many Academy ideas a part of our regular medical-social program. The Academy membership has continued to give its support to these activities.

The Wisconsin Bureau of Maternal and Child Health, under the leadership of Dr. Amy Hunter, is doing a valuable piece of educational work. During the past year, five postgraduate medical circuits were conducted in twenty-five different towns—573 physicians attending the courses.

While future plans are still incomplete, the major efforts of the security act funds will probably be an attempt to influence the high death rate of the first month of life.

In Milwaukee, Academy members have participated in more specific programs of child welfare. Among activities in which they have participated are: (1) a premature infant program designed after the Chicago plan; (2) psychiatric study of the adolescent child among the delinquent group; (3) a preschool round-up among indigent families. This last activity sponsored by the child welfare committee of the county medical society, elicited an unusual degree of interest. One hundred physicians examined all indigent children in their own offices. Six private hospitals and their staffs did all the remedial work necessary for the defects found. A philanthropic citizen provided the funds for a full-time social worker and a part-time directing physician, both of whom worked under medical society authority. The plan brought about a spirit of cooperation between community social agencies and medical society activities, which should do much towards unifying the attitudes of these two groups in the achievement of a common purpose.

A. B. SCHWARTZ
State Chairman.

News and Notes

The American Board of Pediatrics wishes to announce that all applications must be in the office of the secretary at least four months before an examination can be given.

In view of the fact that a large majority of those taking a second examination fail, the American Board of Pediatrics, at their annual meeting in New York City, ruled that applicants who have failed one examination must wait two years before coming before the Board for re-examination and must show evidence of further study or training in pediatrics to justify such re-examination.

The American Board of Pediatrics announces the following dates for future examinations:

Detroit, Michigan: Oct. 26, 1938 (Wednesday), preceding the meeting of Region III of the American Academy of Pediatrics.

Rochester, N. Y.: Nov. 13, 1938 (Sunday), following the meeting of Region I of the American Academy of Pediatrics.

Oklahoma City, Okla.: Nov. 15, 1938 (Tuesday), preceding the joint meeting of Region II of the American Academy of Pediatrics with the Southern Medical Association.

The following have been certified by the **American Board of Pediatrics** since the last report. All these licentiates were examined. In all, 63 applicants were examined; 42 passed, 2 were conditioned in one subject, 11 failed the examination for the first time, and 8 failed the examination for the second time.

Barbara Beattie, M.D., Littleton, N. H.
Bernard Benjamin, M.D., Brooklyn, N. Y.
Theodore Bennett, M.D., Boston, Mass.
Morris Berke, M.D., Brooklyn, N. Y.
Robert S. Buol, M.D., New Britain, Conn.
Charles C. Chapple, M.D., Philadelphia, Pa.
Ralph Weir Daffinee, M.D., Boston, Mass
John A. V. Davies, M.D., Boston, Mass.
Charles H. Deichman, M.D., Morristown, N. J.
Geoffrey Winslow Esty, M.D., Westfield, N. J.
Harry E. Gerner, M.D., Jersey City, N. J
Reginald A. Higgons, M.D., Port Chester, N. Y.
Manuel S. Hirshberg, M.D., Hartford, Conn.
Harold Jacobziner, M.D., New York, N. Y.
William Joseph Kelley, M.D., Boston, Mass.
Milton Kurzrok, M.D., Brooklyn, N. Y.
Thomas M. Lamb, M.D., Brooklyn, N. Y.
John Langdon, M.D., Providence, R. I.
Spencer Ely Levin, M.D., Boston, Mass.
William F. Matthews, M.D., Montclair, N. J.
Margaret Harper McKee, M.D., New York, N. Y.
Philip R. Miller, M.D., Brooklyn, N. Y.
Wallace J. Nichols, M.D., Boston, Mass.
David Edward Overton, M.D., Hempstead, N. Y.
William R. Phillips, M.D., Elmira, N. Y.
Henry Rabnowitz, M.D., Springfield, Mass.
Elizabeth Kirk Rose, M.D., Philadelphia, Pa.
Samuel Rubin, M.D., Philadelphia, Pa.
Harry Benjamin Silver, M.D., Newark, N. J.
Clement A. Smith, M.D., Brookline, Mass.
D. C. Wharton Smith, M.D., Baltimore, Md.
Norman Smith, M.D., Brooklyn, N. Y.

Morris Steiner, M.D., Brooklyn, N. Y.
Henry Sycle Stern, M.D., Richmond, Va.
Benjamin Stoloff, M.D., Brooklyn, N. Y.
Max Tennis, M.D., Boston, Mass.
A. Leonard Van Horn, M.D., Washington, D. C.
John Howell West, M.D., Easton, Pa.
L. Holland Whitney, M.D., Brooklyn, N. Y.
Herman Yannet, M.D., New Haven, Conn.
Carl Zelson, M.D., New York, N. Y.
Bernard Zuger, M.D., Brooklyn, N. Y.

Dr. W. O. Colburn of Lincoln, Neb., died April 11, 1938, of coronary thrombosis.

The eleventh annual Graduate Fortnight of the **New York Academy of Medicine** will be held from October 24 to November 4, 1938. The subject of this year's fortnight is "Diseases of the Blood and Blood-Forming Organs." The fortnight will present a carefully integrated program which will include clinics and clinical demonstrations at many of the hospitals of New York City, evening addresses, and appropriate exhibits.

The purpose of the fortnight is to make a complete study and authoritative presentation of a subject of outstanding importance in the practice of medicine and surgery. The New York Academy of Medicine provides this program for the fundamental purpose of medical education. Consequently all members of the medical profession are eligible for registration. Complete programs and registration blanks may be secured from the New York Academy of Medicine, 2 East 103rd Street, New York City.

The **Virginia Pediatric Society** held its annual clinical meeting on May 12, 1938, at Old Point Comfort, Va. Dr. Helen B. Taussig, of Baltimore, was guest speaker. Dr. W. A. McGee is president, and Dr. J. M. Bishop, 30½ Franklin Rd. S. W., Roanoke, Va., is secretary. The next meeting of the society will be in October at Danville, Va., at the time of the meeting of the state medical society.

The semicentennial meeting of the **American Pediatric Society** was held at Great Barrington, Mass., on May 5, 6, and 7, 1938. The meeting was held in conjunction with the Society for Pediatric Research. One session was devoted to an historical review of the society, representing the development of pediatrics in this country from its inception. The usual scientific program was given. Dr. Clifford G. Grulee was elected president for 1938-39. Dr. DeWitt H. Sherman, of Buffalo, N. Y., was elected vice-president; Dr. Hugh McCulloch, 325 N. Euclid Ave., St. Louis, Mo., was re-elected secretary-treasurer; and Dr. Heyworth N. Sanford, of Chicago, was re-elected recorder-editor.

The **Society for Pediatric Research** held its tenth annual meeting at Great Barrington, Mass., on May 4 and 5, 1938. Dr. L. Emmett Holt, Jr., Baltimore, Md., was elected president and Dr. A. Ashley Weech, 630 W. 168th St., New York, N. Y., was re-elected secretary.

A two-volume edition in Polish of Holt and Howland's *Diseases of Infancy and Childhood*, edited by Holt, Jr., and McIntosh, has recently been published in Warsaw.

Dr. Béla Schick has received the award of the Addingham Gold Medal from the Faculty of Medicine of Leeds University. This is the first time the medal has been awarded since 1935.

Book Reviews

The Appraisal of the New Born Infant. By ETHEL C. DUNHAM, M.D., Children's Bureau Publication No. 242, Washington, D. C., 1938, pp. 24. (May be obtained from the Superintendent of Documents, Washington, D. C., price 10 cents.)

An excellent brief manual on the examination of the newborn infant. It not only deserves a wide reading by physicians, but might well be distributed to senior medical students and hospital residents as a part of their pediatric training. As a matter of fact the reviewer has encountered some "pediatricians" who have been woefully ignorant of much of the material in this pamphlet.

Pneumonia and Serum Therapy. By F. T. LORD and RODERICK HEFFRON, ed. 2, New York, 1938, The Commonwealth Fund, price $1.00.

The increasing use and importance of serum therapy in pneumonia has led to this second edition, bringing our rapidly increasing knowledge up to date. It is unfortunate that so far serum therapy with children has not yielded striking results as in the pneumonias of adults.

Nutrition of the Infant and Child. By JULIAN D. BOYD, New York, 1937, National Medical Book Co., pp. 198.

This is an excellent brief manual of nutrition and diet. The principles of nutrition are clearly discussed in nontechnical language. This is followed by a section on infant feeding and a section on therapeutic dietetics. It is well illustrated although some of the pictures are hardly expressive of the text. It is suitable for reading by educated parents and as a whole is decidedly superior to most of the large amount of material which has been published on the subject.

Management of the Sick Infant and Child. LANGLEY PORTER AND WILLIAM C. CARTER. Ed. 5, St. Louis, 1938, The C. V. Mosby Company, 874 pages, price $10.

The fifth edition of Porter and Carter's deservedly popular "Management" has been extensively revised and enlarged, and considerable new material has been introduced. More space is given to methods of management applicable to older children as well as to infants. Part I is given over to such symptomatic topics as vomiting, convulsions, fever, and pain. Part II discusses systemic conditions with chapters on diseases of the respiratory tract, behavior, allergy, internal secretions, and the like. Part III, over 250 pages, is devoted to detailed descriptions of methods. Practically every subject of importance to the pediatrician is discussed. *Management of the Sick Infant and Child* has become one of the standard texts for the pediatrician, and this revised and enlarged fifth edition will undoubtedly hold the place the previous editions have obtained.

The Psychology of Early Growth. ARNOLD GESELL AND HELEN THOMPSON. New York, 1938, The MacMillan Company, price $4.00.

This volume replaces Gesell's *The Mental Growth of the Preschool Child,* which has gone through several editions and is now out of print. The important work of Gesell and the Yale Clinic of Child Development is so well known to everyone concerned with the infant and young child that it needs no discussion. Although most of the material in this book has appeared before, in its arrangement, clarity, and completeness it makes an important contribution to the library. The publishers are to be complimented on the format as it is one of the most attractive and well printed technical books we have encountered.

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